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SOME ASPECTS OF TRAVEL.*

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I MUST begin by asking your forgiveness where I touch on matters of which you know much more than I.

I cannot claim to have travelled widely, but I have met many travellers, and I have noticed what they tell the public in print of their experiences is one thing, and what they tell their friends by word of mouth is another. So I would like to try to deal with some of the more intimate and personal aspects of travel. They may be trivial or absurd, but one must remember that in a few years, most of our existing methods of transport, together with the physical and mental emotions that accompany them, will be profoundly changed. The time is near when men will receive their normal impressions of a new country suddenly and in plan, not slowly and in perspective; when the most extreme distances will be brought within the compass of one week's—one hundred and sixty-eight hours'—travel; when the word "inaccessible" as applied to any given spot on the surface of the globe will cease to have any meaning. I present myself to-night, then, as in some sort a recorder of experiences which are on the eve of being superseded.

Many years ago a friend of mine was engaged on a survey in a little-known part of Asia. When he came back, I asked him what he used to think about while he was at work. He told me that, as soon as his party had settled to camp routine, his mind moved in an uneasy triangle—he traced it in the air as he spoke—between supplies, possible sickness, and mileage. The figure was as real to him as one on a blackboard. It was

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an isosceles triangle with a narrow base, in the centre of which he felt himself to be walking, between Supplies on the one hand and Sickness on the other, always looking forward to the always retreating point M. When his work was ended, and the survey connected up, the point M, he said, opened and let him through. Till then he had felt himself constricted—harnessed up was his word—between these imaginary lines. I remember we discussed the matter at some length, and in our interest to discover why his thoughts had cast themselves into a triangle, we missed, I think, the main point—that the phenomenon did not show itself till the boy had been worked rather hard.

That roused my interest in what one might call the psychology of moving bodies under strain. Most of the men I was brought in contact with, knew something about the strain of travel, and I asked them—as I have asked many men since—how they realized their experiences to themselves. Few things are more doubtful than any man's, especially any Englishman's, evidence as to his own feelings; and in the rare cases where one meets a man who can or cares to testify, one finds that a very few days of baths, clean clothes, and mixed society blur the clearness of his record. Travellers, like sea-trout, should be caught fresh-run, with their experiences still sticking to them.

Yet it seemed to me, from what I was told, that a number of the men who work under strain and responsibility, as leaders of expeditions—survey prospecting, exploration, or scientific—come to evolve a more or less definite image of their work within the limits of which, or with reference to which, they accomplish that work. For the sake of brevity, let us call those images pressure-lines.

I have no knowledge of any other case except the one I have given, of pressure-lines taking the form of a complete mathematical figure. One man who had led a rather trying expedition, told me that his pressure-line showed itself, after a few days' hard marching, as a diagonally shaded bar or line a little above and a little to the right of his right eyebrow. It was a distinct mental image almost as insistent as a scratch on the glass of one's spectacles; and he felt himself to be constantly pushing in or shouldering towards it. After a good day's work the bar was clear and firm in outline. A bad day, with lost loads and delayed transport, broke it up into ragged curdled flecks. He carried the bar with him for the first few mornings after his return to civilization, exactly as one carried the memory of the school-bell for the first few mornings of one's holidays.

Many of the pressure-lines, of course, cannot be defined in words. One man has written to me:—"I had the picture of my job at the back of my head all the time. For the life of me I couldn't tell you what it was like, but it was there and it was quite real. I kept it by me, or rather it kept by me, till I had had a week's sleep between sheets." And another man told me that his pressure-line appeared to him as an amorphous lump—a cross between a monthly calendar and a porter's load.

That gives an idea of complicated pressure and its attendant horrors. And yet another, who suffered from malaria, compared his pressure-line to that indescribable sensation of swelling and thickening of the hands at the beginning of a bout of fever, which, as you know, is sometimes accompanied by a consciousness of indefinitely protracted parallel ruled lines in the head.

In every case, I noted that the pressure-lines did not show themselves till the man was physically tired out—and a little more. When the pressure of the work was removed and the man was fed again, the lines gradually faded, and could only be recalled by an effort of will.

And I remember, too, when I was a young man, listening to Stanley, who was talking, half to himself, of some work he had done in his early days. He had been under the necessity of covering a certain distance in a certain time, and he ended his monologue with an abrupt fore-reaching movement of his first finger, as though he were pegging down or hooking up something, and he said: "Of course, it was the mileage that worried me!" I often wondered whether that gesture of Stanley's was characteristic, and what form his pressure-lines took.

Several men have told me that their mental idea of their day's work, as distinguished from the responsibility of leadership, was a ribbon or tape unrolling behind them or being dropped from their hands as they marched. In one case my informant said that he thought of distance actually covered as a clear white tape; distance to the next halting-p[illegible] ran forward along the ground like a misty web or skein. Thes[illegible] were not leaders, but subordinates responsible for making good [illegible]y miles per diem. One can see the reason for their linear conceptio[illegible] progress. Expeditions, as a rule, string out in single file, and any mo[illegible]ent of the leaders is seldom to a flank, but up and down the line.

Speaking from my own experience of the one march I ever had to make in a hurry, my impression at the time, as well as the memory that stayed with me afterwards, was that of the unrolling ribbon. Luckily I had not to worry about supplies, but my single object was to get myself and my coolies out of a certain district as soon as possible. My mind projected itself along an imaginary straight line—in this instance white against dull green. It would be interesting if any of the Polar men who work against white backgrounds would tell us how the idea of their work presents itself to them while they are engaged in it. I have heard that the dog-train mail-runners of Alaska and Northern Canada sometimes see their winter trails as short straight lines strung with beads—that is to say, as a diagram of the taut sleigh-traces with dogs attached.

But I think that most travellers do not cast, or do not recall that they cast, their thoughts into mathematical outlines. They retain more or less accurate pictures of incidents that have impressed them personally. I knew one man who said he could run any road that he had marched over, backward between his eyelids like a cinematograph film before he went

to sleep. His companions told me that his diary and written work were quite bad; but that they always took his word for the time and place of any event that had happened on the road. Such a gift as this—and some motorists have the rudiments of it—stands at the top of a scale that ends in those disappointing men who, after months of experience, can communicate no more than a hazy recollection of the places where they got food or water or warmth or shelter. *Punch* has described this type in the man who said: "Rome—Rome. Wasn't that the place where I bought the shocking bad cigars?" It is not at all a bad type to travel with, because it generally gives all its attention to its own duties. A man who carries too many pictures in his head is apt to forget vital things like straps and kettle-lids when the loads are being packed. On the other hand, I have been assured by competent authorities that the camp-cook, if white, ought to be of a sentimental and imaginative disposition. It makes him more generous. I seem to have read lately of a cook whose notion of a twelfth course of a dinner to some returned voyagers was ten boxes of sardines made into a pile with bacon and pastry to match. May one take it that he was imaginative?

I have, not exactly a theory, but an idea, that first-class leaders of expeditions, however definite and urgent their conception of their work, either do not visualize too much or keep their powers of visualization under control. At least, I do not remember to have heard any men who have led men into a tight place and out again, say to me: "I could see exactly what was going to happen when the canoe swamped or the bridge broke." They usually put it: "*When* the bridge broke or *when* the hippo charged, I did so and so, or gave such and such orders." And there is reason for that, too. An old prospector once warned me: "As long as you've only got yourself to think about you can think as much as you damn-well please. When you've other folks' hides to answer for you must quit thinking for your own amusement." So I should be inclined to say that, however great the strain, responsibility does not encourage detailed imaginative excursuses on the road—or on any road—while the work is in hand. Later, when a man is boiling down his log and notes into book form, he falls back on his store of mental pictures, but in the actual stress of travel the first-class man as distinguished from the very first-class second-class man—and this is an important distinction—does not, or decides not to, visualize.

There is another useful gift of visualization not necessarily connected with the executive capacity that may be worth noting: for the reason that it must deal with new material in the years to come. I do not assert that it is impossible to hold intelligent conversation without the help of an atlas. But I do say that as soon as men begin to talk about anything that really matters, some one has to go and get the atlas. And when that has been mislaid or hidden, it is interesting to see how far the company can carry on, scribbling and sketching in the fork-and-tablecloth school, without it. One discovers then, that most men keep a rough map in their heads of

those parts of the world they habitually patrol, and a more accurate—often a boringly precise one—of the particular corner they have last come out of. Motoring has tremendously increased our powers in this respect; for a man who can read a county can learn to read a country, and so on. Many men, I find, can visualize the Empire on Mercator's projection enough for conversational purposes, and I have sat at the feet of one or two superior men who seemed to be able to spin the 24-inch globe, with steamer-distances, in their heads as required. Ideally, of course, every average man ought to be able to do this. Myself, I am like the rest. I only see the atlas, and that roughly, as far as I have used it. Everything outside those limits is a cloudy blur; and the atlas that I see in my mind is based on the first atlas—a little cheap blue and yellow one—that I was forced to study. Other men have told me much the same thing about their mental atlases, and they all agree that we visualize our imaginary travels as from sea-level, with specially vivid pictures of certain capes and ports and land-falls. Naturally, so long as we travel by sea, we must embark from a port and look out for land-falls. But the time is not far off when the traveller will know and care just as little whether he is over sea or land as we to-day know and care whether our steamer is over forty-fathom water or the Tuscarora Deep. Then we shall hear the lost ports of New York and Bombay howling like Tarshish and Tyre. Incidentally, too, we shall change all our mental pictures of travel.

The other day I asked half a dozen men at random what picture or diagram the words, "He went down to the Cape," called up in their minds. Three or four of them who had not been there, said it evolved a mind-picture of what they called the "veld"—probably a cloudy composite photograph from illustrated papers. One said he could see the brownish-red outline of Cape Colony as coloured in his private atlas. But one man, who took the road regularly, answered at once by indicating the long curve of the liner's southerly descent, as that is laid down in the chart. It was his mental sign-talk or way-signal. Assuming identical experience and temperament, if that man's grandfather had been asked the same question in the days of the sailing ship, he would have swung his curve westward to within sight of the Brazil coast, and would have made his southing on the long slant. When that man's son is asked the same question, he would not describe any curve at all. It will have no more meaning for him than the old coach road over the downs by Salisbury has for the modern motorist. His way-sign will be one straight line slightly inclined from left to right—from fifty-one nothing North to thirty-three South, fifteen whatever it is East; and his time-conception—that indescribable diagram of time which rises in each man's mind at the mention of a voyage of known length—will be shrunk to a little block or bead or shadow representing forty-eight or fifty hours. And so it will be with all voyages. At present, most men's mental shorthand of the run to India is a zig-zag of four: London—Gibraltar; Gibraltar—Port Said;

Port Said—Aden; Aden—Bombay; of the Australian voyage, a zig-zag of three: the line running straight from Aden to the southern continent generally. These will be all straightened out into single lines, each carrying its own vastly shortened time-conception.

But all this, as you will say, is in the air. Let us leave it there, and consider for a while the illimitable, the fascinating subject of smells in their relation to the traveller. We shall soon have to exchange them for blasts of petrol and atomized castor-oil. Have you noticed wherever a few travellers gather together, one or the other is sure to say: "Do you remember that smell at such and such a place?" Then he may go on to speak of camel—pure camel—one whiff of which is all Arabia; or of the smell of rotten eggs at Hitt on the Euphrates, where Noah got the pitch for the Ark; or of the flavour of drying fish in Burma. Then the company begin to purr like cats at valerian, and, as the books say, conversation becomes general.

I suggest, subject to correction—there are only two elementary smells of universal appeal—the smell of burning fuel and the smell of melting grease. The smell, that is, of what man cooks his food over, and what he cooks his food in. Fuel ranges from coal to cowdung—specially cowdung—and cocoanut-husk; grease from butter through ghi to palm and cocoanut oil; and these two, either singly or in combination, make the background and furnish the active poison of nearly all the smells which assault and perturb the mind of the wayfaring man returned to civilization. I rank wood-smoke first, since it calls up more, more intimate and varied memories, over a wider geographical range, to a larger number of individuals than any other agent that we know. My powers are limited, but I think I would undertake to transport a quarter of a million Englishmen to any point in South Africa, from the Zambezi to Cape Agulhas, with no more elaborate vehicle than a box of matches, a string or two of rifle cordite, a broken-up biscuit box, some chips of a creosoted railway sleeper, and a handful of dried cowdung, and to land each man in the precise spot he had in his mind. And that is only a small part of the world that wood-smoke controls. A whiff of it can take us back to forgotten marches over unnamed mountains with disreputable companions; to day-long halts beside flooded rivers in the rain; wonderful mornings of youth in brilliantly lighted lands where everything was possible—and generally done; to uneasy wakings under the low desert moon and on top of cruel, hard pebbles; and, above all, to that God's own hour, all the world over, when the stars have gone out and it is too dark to see clear, and one lies with the fumes of last night's embers in one's nostrils—lies and waits for a new horizon to heave itself up against a new dawn. Wood-smoke magic works on every one according to his experience. I live in a wood-smoke country, and I know how men, otherwise silent, become suddenly and surprisingly eloquent under its influence.

And next to wood-smoke for waking rampant "wanderlust" comes the

smell of melting grease—such a smell or bouquet of smells as one may gather outside a London fried-fish shop. It is less sentimental and vague in its appeal than wood-smoke, but it hits harder. Where grease is melting, something is being cooked, and that means a change from tinned food for one night at any rate. It is an opulent, a kaleidoscopic, a semitic smell of immense range and variety of colour. Sometimes it reconstructs big covered bazaars of well-stocked cities with the blue haze hanging in the domes; or it resurrects little Heaven-sent single stalls picked up by the road-side, where one can buy penny bottles of sauce or a paper of badly needed buttons. It implies camels kneeling to unload; belts and straps being loosened; contented camp followers dodging off to buy supplies—turmeric assafœtida, curry-stuffs; men washing their hands in sand before dipping them into the greasy pewter platters. And the next gust or surge of it may be pure Central Asia—thick and choking as butter-lamps before a Tibetan shrine—a Tibetan shrine, with frost in the air, one star on the tip of a mountain, and a brown-cloaked Bhotyali rustling up through dry maize-stalks to sell a chicken. Or it may thin out to a mere echo of an appeal that calls up all the pulse and thrill and clamour of the true tropic night—blazing moonlight, black shadow, the roar of the tree-toads, a touch of Chinese matting, a gust of jasmine or champak, and the languid puff of a warm phosphorescent sea.

To me, as to others, a fried-fish shop can speak multitudinously for all the East from Cairo to Singapore, and I have heard West Coast men say that, when the smell turns bitter, it will sometimes duplicate the smell of their palm-oil chop, and cause them to re-live horrible depressing evenings by the light of kerosene lamps, hung under corrugated iron roofs of factories beside brown rivers that bubble. It does not cover the South Seas, that wonderful fifth quarter of the world, where, I believe, the smell of first appeal is burning coconut-husk, a heavy loading of coconut-oil, and a dash of salt coral reef. But it is no mean magician, as we all know.

And so much for universals. Coming now to smells of particular appeal, what would most vividly remind a Polar explorer of past experiences? I suggest that ether-like smell given off by the flame of a big spirit-lamp when it is flattened out against the heated metal cooking plate above—an unmixed smell, simple of itself, like Falstaff's sack. I should put the limits of this appeal roughly as from the Seventies to either pole. From the Seventies to the Sixties runs that belt of unsanctified latitudes which are the stamping-ground of the winds, the wilderness and the fringes of the restless ice, all linked together, in the minds of men who know it, by the desolate smell of the stranded berg as it piles up reeking with ooze gauged off the sea-floors. Melville, of the *Jeannette*, once told me that it would "send your heart into your boots—if you hadn't eaten them already." At the Sixties and down to Labrador, it seems to me we reach kindly timber and a suggestion of meat on the hoof. The smell of stranded ice is mixed with the clear breath of seas that are not

always frozen, and the acrid tang of a raw moose-hide being passed back and forth through wood-smoke to cure it—this last as characteristic as the smell of home-made rimpje on a Dutch farm at the other side of the world. A little lower, the appeals thicken and become more complex. I suggest evergreens sweating in the sun; birchwood smoke; the oily bark itself; pine-gums, resin and tallow melted together; the clean-swept smell of milky-green snow-water pouring over pebble bars; and, not so far in the background, a suspicion or a camp-shifting certainty of skunk. Here—say 50° N. and 65° W.—we meet our friend the horse, or rather he pushes his way into the rotten-wood smudge (that is an awakening smell, too) beside us. He keeps us company west through the grass-scented prairie air till we are more conscious of him and his saddlery than any other flavour in the landscape.

There is a heart-searching little motif of five notes: horse; old saddlery; coffee; fried bacon; and tobacco (from cut plug to maize-leaf cigarettes)—that can carry a man down from high dry camps in the Selkirks, or wet ones in the Oregon, down and down over red spicy dust and dead white dust through the scent of sage-brush and sharp peppery euphorbias, down to the torrid goat-scented south where fried beans, incense and the abominable brassy smell of pulque will pass him on to all the forlorn brood of mangrove foreshore and yellow fever stinks, until he leaves his horse on the beach, and the Tropics lift up his heart with the wholesome rasp of sunbaked coral and dried fish.

Forgive me, ladies and gentlemen. I will not go on with the catalogue, though I feel like the commercial traveller in the story, who said: "If you don't care to look at my samples, d'you mind *my* having a look at 'em. It's so long since I've seen them."

It is probable that the future will have no place for these links with past delights and labours—that they will be forgotten like the labours themselves—as we have forgotten the smell of home-made soap or the whistle and rap of the flails on a threshing-floor. Only a little while ago a man wrote me from Northern Canada: "We have broken into a new belt of wheat 40 miles wide—and we have left the horse behind." Even now one can charge by rail in less than a week through the exquisitely graduated and significant series of smells, that lies like iridescence on an oyster-shell, over the last 2500 miles of South Africa, and one can return with no more than a general impression of sunshine and coal-smoke. And, as people always say in the middle of a revolution: "We are only at the beginning of things."

Conceive for a moment a generation wholly divorced from all known smells of land and sea-travel—a generation which will climb into and drop down from the utterly odourless upper airs, unprepared in any one of its senses for the flavour, which is the spirit, of the country it descends upon! Everything that we have used till now has allowed us time for a little mental adjustment of horizons—time and contact with the changing

earth and waters under us. In the future, there will be neither mental adjustment nor horizons as we have understood them: not any more of the long days that prove and prepare, nor the nights that terrify and make sane again, neither sweat nor suffering, nor the panic knowledge of isolation beyond help—none, so far as we can guess, of the checks that have hitherto conditioned all our travels.

And hitherto our life has only taught us to love what we have suffered for or with. One loves a stray dog after one has had to sit up with him for a night or two. How much more that corner of the Earth to which we have given our very hide and health and reputation!

And it is the same on the human side. Men like a man who has shown himself a pleasant companion through a week's walking tour. They worship the man, who over thousands of miles for hundreds of days, through renewed difficulties and efforts, has brought them without friction, arrogance, or dishonour to the victory proposed, or to the higher glory of unshaken defeat. Anything like a man can bustle hounds after a sinking fox, but it takes something like a man to bring them home with their sterns up after they have lost him, or—seen him run into by another pack. It is one of the mysteries of personality that virtue should go out of certain men to uphold—literally to ennoble—their companions even while their own nerves are like live wire, and their own mouths are full of the taste of fever and fatigue. There is no headmark by which we can recognize such men before they have proved themselves. Their secret is incommunicable. One man, apparently without effort, inspans the human equivalent of "three blind 'uns and a bolter" and makes them do miracles. Another, working hard all the time, scientifically reduces half a dozen picked men to the level of sulky, disloyal schoolboys. And everybody wonders how it happened.

The explanations are as bewildering as the facts. A man was asked some time ago why he invariably followed a well-known man into most uncomfortable situations. He replied: "All the years I have known So-and-So, I've never known him to say whether he was cold or hot, wet or dry, sick or well; but I've never known him forget a man who was." Here is another reply to a similar question about another leader, who was notoriously a little difficult to get on with. One of his followers wrote: "So-and-So is all you say and more, and he grows worse as he grows older, but he will take the blame of any mistake any man of his makes, and he doesn't care what lie he tells to save him." And when I wrote to find out why a man whom I knew preferred *not* to go out with another man whom I also knew, I got this illuminating diagnosis: "So-and-So is not afraid of anything on earth except the newspapers. So I have a previous engagement." In the face of these documents, it looks as though self-sacrifice, loyalty, and a robust view of moral obligations go far to make a leader, the capacity to live alone and inside himself being taken for granted.

But then come the accidents for which no allowance is made—or can be made. A good man, who has held a disorganized crowd together at the expense of his own vitality, may be tried, slowly or suddenly, beyond his limit, till he breaks down, and, as Hakluyt says, is either "ignominiously reported or exceedingly condemned." There is a limit for every man, an edge beyond which he must not go. But here at home only the doctor, the nurses, and the clergymen see what happens next—not the caravan, not the grinning coolies, and the whole naked landscape—and afterwards all the world.

However, these things, and worse, are part of the rule of the road. They have never hindered men from leading or following. Even in those days a man has but to announce he is going to gamble against death for a few months on totally inadequate cover, and thousands of hitherto honest Englishmen will fawn and intrigue and, if necessary, lie like any one you choose to think of—in order to be allotted one life share in the venture.

But what of the future? Into what terms will this world-old, foot-pound energy of travel translate itself under the new conditions? Here is our position. Up to the present we have been forced to move in two dimensions by the help of the three beasts of burden and a few live coals in a pot. Now we perceive that we can move in three dimensions, and the possibilities of our new freedom distract and disturb us in all relations. This is because our minds are still hobbled and knee-haltered by inherited memories of what were held to be immutable facts—distance, height and depth, separation, homesickness, the fear of accident and foul weather. The sea, in spite of our attacks, is still unplumbed, salt and estranging; a mountain range means so many days' delay or *détour*; so many extra rations, sure changes of heat and cold. The desert and the wilderness have still to be approached by cautious sap and mine—depôt and caché. Where there is no water for 200 miles, we shake our head and limp round it. A little while ago we should have done so, humbly, glad to be excused. Now we step out of our path grudgingly, resentfully, resolute to come back again and take no refusal.

Presently—very presently—we shall some back and convert 200 miles across any part of the Earth into its standardized equivalent, precisely as we convert 5 miles with infantry in column, 10 with cavalry on the march, 12 in a Cape cart, or 50 in a car—that is to say, into two hours. And whether there be one desert or a dozen mountain ranges in that 200 miles will not affect our time-table by five minutes.

Month by month the Earth shrinks actually, and, what is more important, in imagination. We know it by the slide and crash of unstable mental all around us. For the moment, but only for the moment, the new machines are outstripping mankind. We have cut down enormously—we shall cut down inconceivably—the world conception of time and space, which is the big flywheel of the world's progress. What wonder that the great world-engine, which we call Civilization, should race and

heat a little; or that the onlookers who see it take charge should be a little excited, and, therefore, inclined to scold. You could witness precisely the same flurry in any engine-room on the Atlantic this evening, where a liner happens to be pitching her propellers out of water. For the moment the machines are developing more power than has been required for their duties. But just as soon as humanity can get its breath the machines' load will be increased and they will settle smoothly to their load and most marvellous output.

Frankly, one is not so much interested in the achievements of the future as in the men of the present who are already scouting and reporting along its fantastic skyline. All, or nearly all, that can be accomplished by the old means has been won and put to general account. The old mechanism is scrapped: the moods and emotions that went with it follow. Only the spirit of man carries on, unaltered and unappeasable. There will arise—they are shaping themselves even now—risks to be met as cruel as any that Hudson or Scott faced; dreams as world-wide as Columbus or Cecil Rhodes dreamed, to be made good or to die for; and decisions to be taken as splendidly terrible as that which Drake clinched by Magellan, or Oates a little further south. There is no break in the line, no loads are missing; the men of the present have begun the discovery of the new world with the same devoutly careless passion as their predecessors completed the discovery of the old.

The PRESIDENT (before the paper): Before I call upon Mr. Rudyard Kipling to address us, I ought perhaps to say a word as to the genesis of his paper. Nearly two years ago Mr. Kipling did us the honour, upon my invitation, of coming to one of the annual banquets of this Society, and there he made one of those fascinating, but all too infrequent, speeches, in which he showed the most sympathetic appreciation of the work, position, and objects of our Society, and of the place that we occupy in the estimation of the world. The moment that I heard that speech I saw that Mr. Rudyard Kipling was predestined by Providence to read a paper to us, and accordingly, while he was still under the influence of the good fare with which we had provided him, I extracted something like a half-promise from him. It is the fulfilment of that kind pledge on his part that we are about to witness, and the appreciation of his good nature entertained by the Fellows at large is sufficiently shown by the fact that we have overflown the limits of the smaller theatre in which we usually meet, and have been constrained to do what has seldom happened in our experience, namely, to take this great hall in order to accommodate all those who wish to come and hear him. Ladies and gentlemen, great travellers have sometimes, perhaps rather more frequently than is generally supposed, been great men of letters, and the writings of some of the most famous travellers in the world, from Herodotus down to Kinglake and Doughty in our own times, have been masterpieces of literature. To-night we are to have presented to us the inverse phenomenon; and a great man of letters, one of the foremost whom our race has produced, is coming before us, to show that he too has tasted the joys, understands the romance, and has penetrated the secrets of travel. It is by this instinct and experience on his part that we are about to profit, and without further ado I will ask Mr. Rudyard Kipling to deliver his address.

The PRESIDENT (after the paper): I am going to ask Lord Bryce to move a vote of thanks to the reader of the paper, but before he does so, I should like on your behalf to extend a word of welcome to him, on the first occasion on which many of us will have met him for many years, on his return from most distinguished service to his country abroad. No British Ambassador within living memory has been so widely popular in the United States of America, or has exercised so healthy and beneficent an influence on behalf of his country. But we as geographers here remember that before Mr. Bryce (as he used to be known in those days) became a diplomatist, he was great as a traveller, an explorer, a climber, and an historian of travel. There was, I believe, a period in his existence in which he plunged into the dreary morass of politics. I do not know if he ever again intends to tread that treacherous swamp—I hope for his sake, not. I hope that he will continue to keep his feet on the high plateaux of jurisprudence and history, from which he will continue to preach words of wisdom and good counsel to his fellow-countrymen. And most of all, may I be allowed to say that I hope Lord Bryce will not forget his love for that science of which we in this hall are devotees, namely, the science of geography, and that the compliment he is about to pay us by speaking, will only be the forerunner of future participation in our work.

Viscount BRYCE: First of all allow me to render my cordial thanks to the President of the Royal Geographical Society for the very kind words in which he has introduced me to you, and has laid upon me the pleasant duty of moving a vote of thanks to Mr. Rudyard Kipling. Praise from one who has filled such high offices, who has ruled as Viceroy over 300 millions of men with brilliant distinction, praise from such a servant of the Empire, and one so true to its interests, is praise indeed, and I thank him most heartily for it. I feel it an honour, ladies and gentlemen, to be asked to move this vote of thanks to Mr. Kipling. He is eminently the poet of travel, he has that which lies at the bottom of the heart of every true geographer—a love for the Earth's surface, a desire to see every part of the Earth's surface, be it more beautiful or less beautiful, to know what it is to realize what our heritage is in this planet, and he has been in an eminent degree the writer of our time who has forcibly expressed the delight and joy of travel, and the poetry there is in travel as well as in scenery. Not even Robert Louis Stevenson, with his wonderful pictures of the Pacific islands, and the leper living near Kohhala, on the north-east coast of Hawaii, where he saw the ships go to and fro from Honolulu to Hilo, not even Pierre Loti in his striking descriptions of the grey seas of Iceland and the "enchanted gardens of the East" at Singapore, not even they nor any writers of this generation have given us so many vivid sketches of scenery and of the various aspects of nature, charming or terrible, but in his hands always interesting, as those with which Mr. Kipling has enriched our literature. Those of you who have travelled must often have felt (as has often happened to me), when they came to any place that made a peculiarly deep and peculiar impression upon them, their helplessness in trying to express what it conveyed. Most travellers do feel the poetry of scenery, but few indeed are able to bring it out from their lips, and still fewer from their pen, and often upon the storm-swept Falkland islands, or in the flowery meadows of Manchuria, or in the high valleys of the Altai mountains, where Kalmuks and Kirghiz tend their flocks, I have, when penetrated by the strangeness of the landscape, felt inclined to exclaim, "Oh for an hour of Rudyard Kipling!" To-night he has carried us into a different sphere. To-night he has given us a study in the psychology of travel, eminently penetrating and imaginative, as is all his work, and he has outlined for us a means of inquiring how association through

the senses brings up recollections, largely of course through colour, even more, perhaps, through sound, and most of all through scent—the most insidious, the most delicate, most subtle, most far-reaching and enduring of all sense-recollections. Which of you who has not sometimes felt some whiff of scent that has carried him back to his early childhood, and recalled incidents that had seemed wholly forgotten? I will not attempt to follow Mr. Kipling in that admirable analysis he gave us of the various scents which belong to various parts of the world. Were there time to add to the list he has given one might think of Napoleon Bonaparte, who used to say that when he shut his eyes to think of his native Corsica, there came to him the peculiar scent of the *macchia*, that mixture of aromatic plants and tangled heath which covers the hills of Corsica and sends its sweet yet pungent fragrance miles out over the Mediterranean. Mr. Kipling has also presented to us a future in which travel will be chiefly through the atmosphere. I shall not attempt to follow him in those airy flights, except to indulge in one reflection, which will probably have occurred to you already. It is this. How different will the world be when our present ideas of distance and of the time needed for traversing space have been practically obliterated! The world is, by the reduction of distances, becoming very small, but as respects population, is becoming very large. Its problems are increasing in number, and increasing even more in their difficulty. Those who have noted the imperfect wisdom which is applied in modern countries to the solution of these problems, must feel that while the problems of the world are growing too huge for the wisdom of man to cope with, the area of the world is now too small for the curiosity and the ambition of man, and no means is visible by which we can increase that area or reach any other part of the universe. It was in one way an entrancing prospect that was held out to us by Mr. Kipling of a time when we might easily and safely pass from one part of the world to another, but to me it seemed also to have a melancholy side in the thought that so many of the pleasures of leisurely travel would necessarily pass away. If any of you are inclined to envy the men and women of the future who will be able, in the course of an afternoon to reach the United States, and South Africa to-morrow morning, and to wish that you had been born in those days, let us comfort ourselves with the thoughts that at those heights which the airships will traverse, there will be no colours of landscape to enjoy, for colour fades out of things when you pass over them at a height of 5000 or 6000 feet. Neither will any scents reach the future high-level travellers. So let us come back to the old conclusion that we may be well content with the world in which we live, even if it be not the best of all possible worlds. So far, at any rate, as the enjoyment of external nature is concerned, it seems to be the best of all possible worlds in which we may rejoice to have lived. We may also be well content when we think of the pleasure we have had in listening to-night to a discourse upon travel, which was full not only of exquisitely close observation, but of a suggestive imagination. I move that the thanks of the meeting be given to Mr. Kipling for the address with which he has delighted us.

The PRESIDENT: It would be almost impossible to improve upon and it might be easy to spoil the admirable expression of the thanks of this meeting to Mr. Kipling, which we have just had in the speech of Lord Bryce. Indeed, this has been a wonderful evening, because in the first place we had that ingenious and entrancing paper, which I beg all of you not merely to remember as you have heard it to-night, but to read again and again when you see it in print; and then following upon the paper, we have had the delightful little speech to which we have listened from the returned ambassador. We will now terminate

our proceedings, and I will ask you to signify your thanks to Mr. Kipling in the usual way.

Mr. RUDYARD KIPLING: It is very kind of you to listen to me so patiently, and I thank you from my heart for the welcome you have given me.

THE EVOLUTION OF A CAPITAL. A PHYSIOGRAPHIC STUDY OF THE FOUNDATION OF CANBERRA, AUSTRALIA.*

By GRIFFITH TAYLOR, B.Sc., B.E. (Syd.), B.A. (Cantab.), F.G.S.,
Acting Commonwealth Geologist.

I. The Position of Canberra, and Boundaries of the Territory. II. The Relation of the Capital to the Distribution of Population in Australia. III. The Choice of the Capital Area. IV. The Physiography of the Capital Territory—(A) Geology; (B) Topography; (C) Physiography; (D) Meteorology. V. Work accomplished at the Capital. VI. Plans for the Future.

I. POSITION OF CANBERRA.

IT is only in the most up-to-date atlases that this youngest of the Empire's cities is marked. Geographers in touch with Australian cartography have been amused by the prominence given to various obscure hamlets in New South Wales by mapmakers anxious to give an air of modernity to their productions. Maps of some years ago can be dated by the large advertisement given to Dalgety. Later the town of Yass is prominently inserted. In fact, it is only since March, 1913, we have definitely known the name of the capital, although complete surveys of the site have been ready for several years.

Where, now, is Canberra? It was formerly but the name of a parish consisting of a church, a post-office, and only one house of any size, on the sheep station of "Acton." Every one knows the position of Melbourne and Sydney. If now a line be drawn between these cities, the distance is just over 400 miles, and one-third of the way from Sydney—about 150 miles—is the site of the Federal capital. By railway, however, the distance is just 200 miles.

Communications.—The nearest railway station was Queanbeyan, a small town on the branch railway from Goulburn to Cooma and the Southern Alps. A federal railway is now almost completed across the intervening 8 miles, and passengers will soon be able to journey comfortably from Sydney right to the capital. But from Melbourne the traveller will still leave the train at Yass and follow the mail road for 36 miles to the south. There are no engineering difficulties to be overcome, and in a few years a loop railway owned by the Commonwealth will run across the territory connecting with State lines near Yass (north) and near Queanbeyan (south-east).

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* Royal Geographical Society, January 12, 1914. Map, p. 480.

Of greater interest, perhaps, is the proposed federal railway (about 80 miles long), which is to link the Canberra railway to the Federal port at Jervis bay. This will pass wholly through New South Wales territory. It will cross the Shoalhaven river (1870 feet) and climb the Sassafras tableland (2300 feet) before descending the Turpentine scarp to the sea. The whole has been surveyed, and a considerable portion of the line definitely located, of which the ruling gradient is 1 in 66. It passes through several timber belts and some rich but restricted basalt farm lands. On the

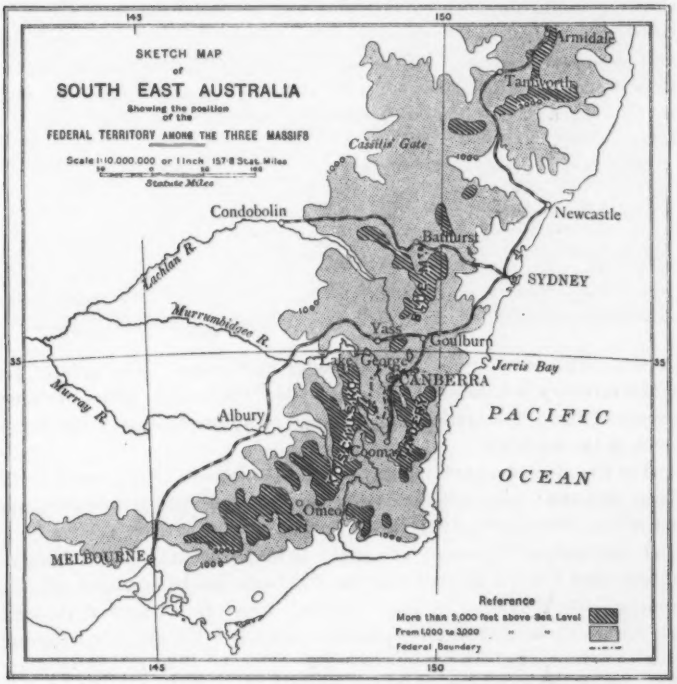


FIG. 1.

whole, however, the country is not fertile, especially in the east, where it is largely composed of sterile Permo-Carboniferous sandstones. At Jervis bay the buildings of the Federal Naval College are nearly completed. The naval station is situated on a sheltered bay behind the southern headland.

Boundaries and Area of the Territory.—The Federal territory lies in the south-east of New South Wales, about 50 miles to the north-east of Kosciusko, the highest mountain in Australia. Indeed, the granite plateau in the south-west of the territory continues uninterruptedly to the summit of the continent (7340 feet).

The territory, for the most part, is defined by no very striking natural features, and on the north-west the boundary is purely artificial—being a line from Mount Coree to a low hill near Hall (see Fig. 6). On the north-east the line runs along the low divide separating the Yass river from the Molonglo valley. Near Queanbeyan the State railway becomes the boundary, along the east of the territory. Thence it crosses the big river—the Murrumbidgee—just south of Tharwa. In the south the boundary lies on the divide separating the Gudgenby river system from the Upper Murrumbidgee valley, and on the west runs along the divide between the Cotter and the Goodradigbee rivers. Its greatest length from north to south is about 46 miles, and its average breadth something less than 20 miles. The area is thus about 900 square miles, or equal to that of a small European country, such as the grand duchy of Luxembourg.

The area is divided as follows :—

	Acres.
Lands compulsorily acquired	87,907
Alienated lands	95,539
In process of alienation	81,239
Area under lease	248,206
Unoccupied Crown lands	55,336
Total area ...	568,227

Of this, 3193 acres are at present under cultivation. The greater part of the territory is held as sheep and cattle "stations." There are about a score of these, the cattle being confined to a few stations in the rugged south of the territory.

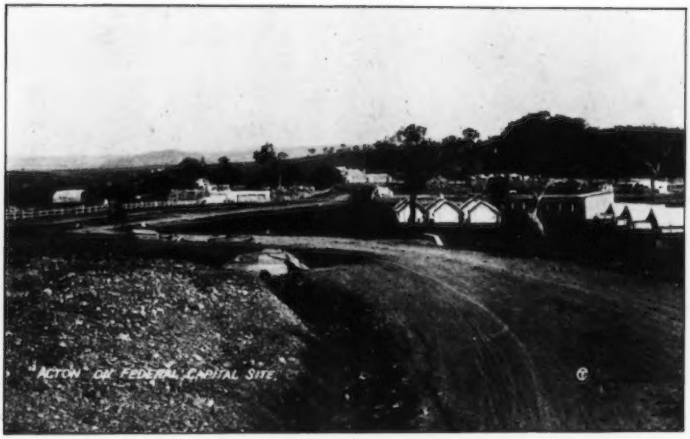
The live stock is approximately as follows : horses, 1762 ; cattle, 8412 ; sheep, 224,764 ; pigs, 1393. At the beginning of 1913 it was estimated that about 2240 people dwelt in the territory.

Topography of Vicinity.—If a contour map of south-eastern Australia be consulted,* it will be seen that the highlands can be arranged into four great massifs, separated by four "Gates," which lie at several thousand feet lower elevation than these plateau residuals. We are here concerned with the three southern massifs (see Fig. 1). The Blue mountain massif immediately behind Sydney, with an elevation of over 3000 feet, is separated from the two southern massifs by the *Lake George Gate.* The Kosciusko and Tindery massifs are separated by the long deep valley of the Murrumbidgee-Snowy river systems, the divide being at the *Cooma Gate.* Obviously the Federal territory is well situated on the highland belt between Sydney and Melbourne. The elevation of the city is about 1900 feet above sea-level, but the territory culminates in Mount Bimberi in the south-west, which is 6200 feet high. The effect of this elevation on the climate will be considered in a later section.

* The first close approximation was published in Fig. 19, Bulletin 8, issued in 1911 by the Commonwealth Bureau of Meteorology, Melbourne.

THE FIRST FEDERAL SETTLEMENT ON THE SLOPES OF MOUNT MUGGA, SURVEY CAMP, 1910.

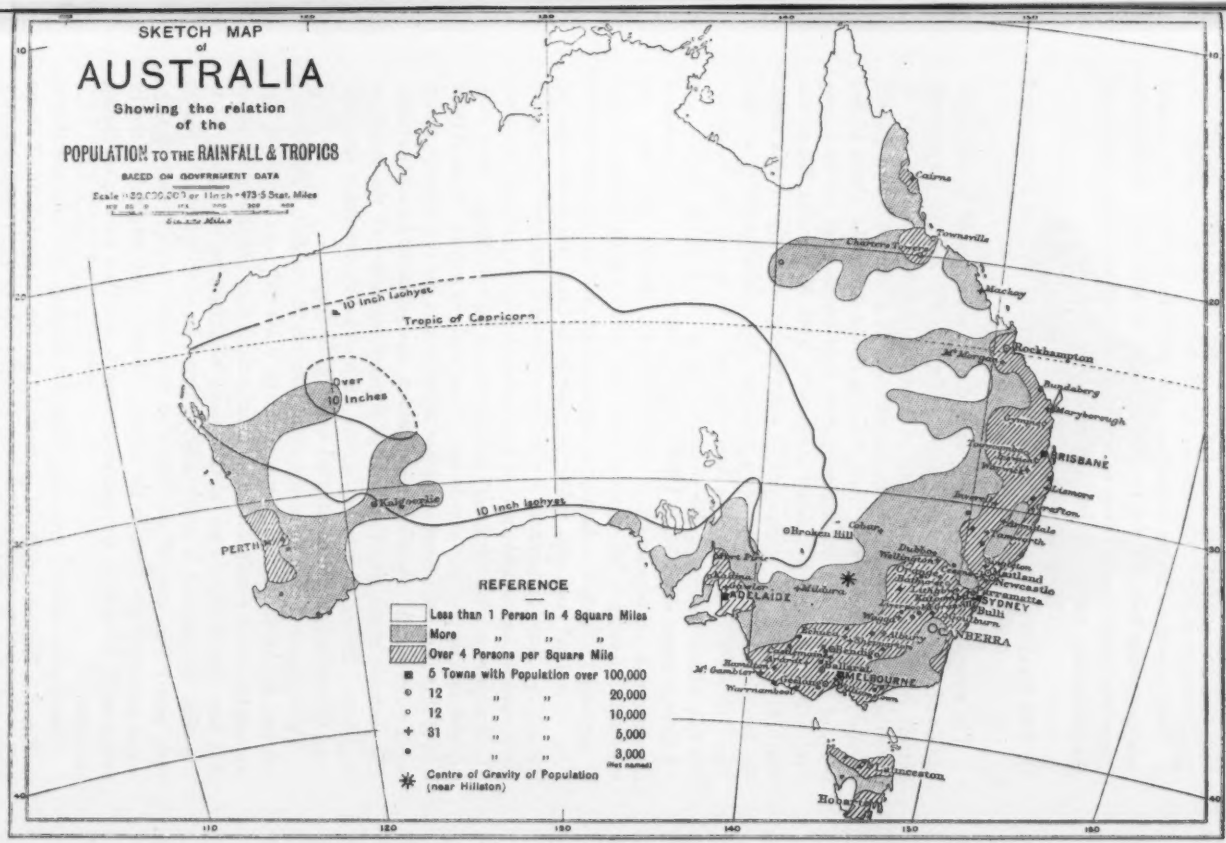
THE FEDERAL CAPITAL SITE, 1913.



"ACTON," THE OLD HOMESTEAD WHICH FORMS THE CENTRE OF THE CAPITAL SITE.

THE MOLONGLO RIVER WHICH FLOWS THROUGH THE SITE OF THE CITY.

FIG. 2.


SKETCH MAP
of
AUSTRALIA
Showing the relation
of the
POPULATION TO THE RAINFALL & TROPICS
BASED ON GOVERNMENT DATA
10 Inch Isohyet
Tropic of Capricorn
Over
10 Inches
10 Inch Isohyet
REFERENCE
Less than 1 Person in 4 Square Miles
More " " "
Over 4 Persons per Square Mile
5 Towns with Population over 100,000
12 " " 20,000
12 " " 10,000
31 " " 5,000
" " 3,000
Centre of Gravity of Population
(near Hillston)
Cairns
Townsville
Mackay
Rockhampton
Bundaberg
Maryborough
BRISBANE
Ipswich
Toowoomba
Grafton
Lismore
Broken Hill
Dubbo
Wollongong
Goulburn
Newcastle
Parramatta
SYDNEY
Bathurst
CANBERRA
ADELAIDE
Mt Gambier
MELBOURNE
Launceston
Hobart
Kalgoorlie
PERTH

With regard to future settlement, the territory occupies the natural gateway to the best-watered temperate region in Australia. An alternative railway route from Sydney to Melbourne has been surveyed, connecting the Cooma line with the Victorian railway in Gippsland.

II. The Relation of Canberra to the Distribution of Population in Australia.

The situation of a capital city should have some regard to the distribution of the people to be governed therefrom. Fig. 2 shows very clearly certain features in the settlement of Australia. The population may be described as south-seeking and centrifugal. If a line be drawn joining Gympie (Queensland) with Port Pirie in South Australia about 15 per cent. of the area lies to the south-east (and forms what we may conveniently term the "south-east segment"), while 85 per cent. lies to the north-west. But the population is very closely inversely in this ratio. On the sketch-map every town of over 5000 inhabitants is shown. There are sixty such centres in Australia, and of these only ten lie outside this line within the area which constitutes 85 per cent. of the whole.

Here it seems advisable to briefly consider the reasons for this unusual concentration of population in the south-east. Briefly put, they are essentially climatic. The tropic of Capricorn cuts off more than one-third of Australia. There is naturally no great inducement for the close settlement of tropical Australia while there are large areas available south of the tropic. Much of Australia's wealth is obtained in the northern region; but it consists for the most part of raw material, such as pastoral products, which require a relatively small expenditure of human energy, or of such valuable mining products as gold and tin, or lastly of sugar. None of these lead to that close settlement which has taken place in the last century, as, for instance, in U.S.A. Small farming, wheat, coal, iron, and manufactures, will probably never give rise to large populations north of the tropic of Capricorn. Hence we see that on the basis of future economic development the capital should be situated south of the tropic.

The second and even more important factor is the rainfall. The annual isohyets in Australia form approximately concentric ovals around the arid centre of the continent. This arrangement does not, however, mean that the coastal regions are always wet; although, unfortunately, it is true that the interior is nearly always dry. In each month the region with *over* 1 *inch rainfall* consists of a somewhat crescent-shaped area, whose concavity lies towards the centre. These "rain crescents" slowly swing round, from north through east to south, and then back again during the year.

Two typical monthly crescents, those for January and July, are shown in Fig. 3. The chief point of interest is that the "pivoting line," about which they may be said to swing—as pointed out by the Commonwealth Meteorologist—passes almost through Canberra. There is hereabouts a

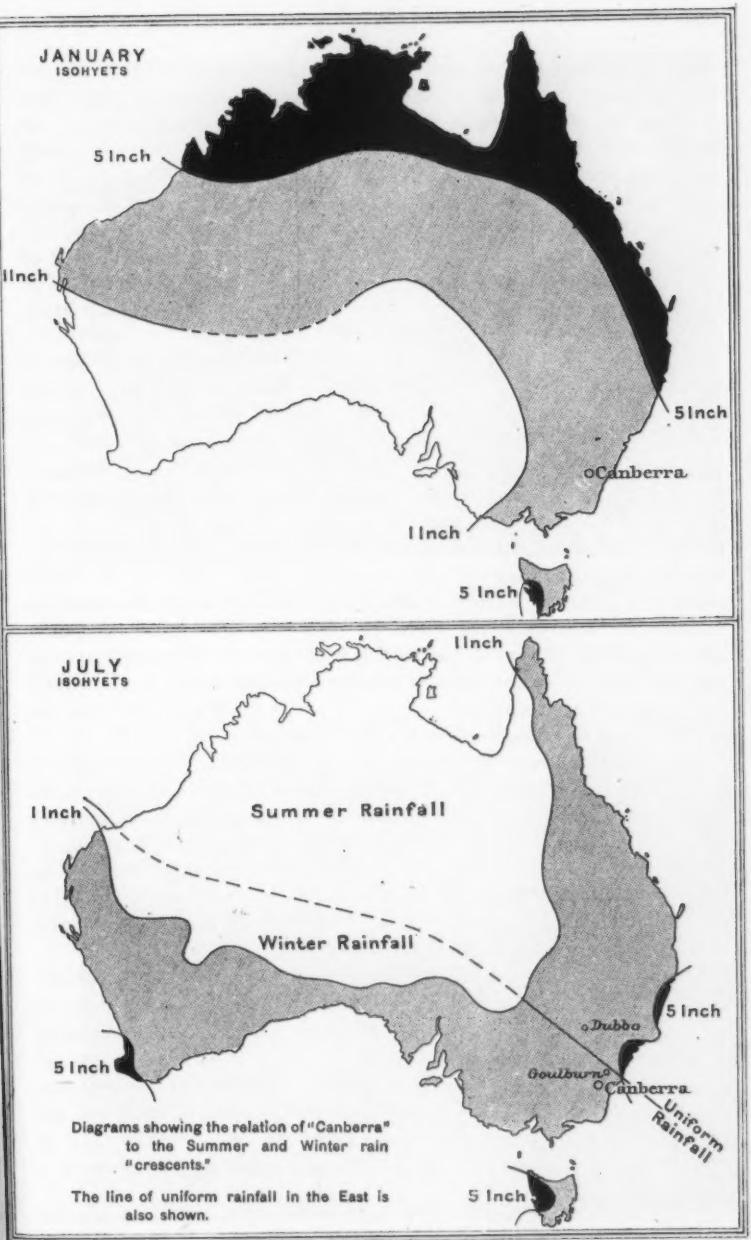


FIG. 3.—RAIN-CRESCENTS FOR JANUARY AND JULY.

narrow belt running from south-east to north-west (near Goulburn and Dubbo), where the rainfall is much the same each month in the year. This is due to the overlapping of the summer and winter "crescents" in the south-east of the continent. In the north-west the two "crescents" only just touch North-West cape at six-month intervals, and so results the very arid coastal region near Carnarvon. Neither crescent covers the centre of Australia with its fruitful showers. It may be stated *en passant* that these crescents are directly due to the annual north and south swing of the sun, combined with the prevalence of the south-east winds. The latter are offshore and dry in the north-west, and onshore and rain-bearing in the east.

If we would study the future we should survey the past. Our cousins in the United States have passed through a phase of colonization which is yet to be experienced in Australia. They have closely settled the Eastern States. The 20-inch annual isohyet runs north and south, and practically divides U.S.A. into two equal areas. Approximately, all States to the east have over eighteen people to the square mile, while to the west there are less than six to the square mile. Thus closely do the isohyets control population.* The only area of country in Australia, really suitable for *close* farming and not yet opened up, is the forest and wheat belt in the south-west corner of Western Australia, and this portion of Australia has undoubtedly a large future before it. But it is of so small an area—about one-third of that of the British Isles—that we may safely assume that the majority of the white population will always live in the south-east corner of the continent. Hence it would seem advisable that the capital should be in the south-east of the Commonwealth.

The Commonwealth Statistician has determined the centre of gravity of the population figures for Australia and Tasmania, and finds, as we should expect, that it occupies almost the centre of this triangular area in the south-east. It lies in New South Wales in the county of Nicholson, on the river Lachlan, and is near the small town of Hillston. This locality is situated on the dry western plains, and has only a rainfall of about 15 inches. It is obviously unsuitable for a capital city; but it gives us a starting-point for discussing the suitability of various sites.

The centre of population and the centre of the "south-east segment" of the continent both lie in New South Wales—the "Mother State" of the continent. This justifies the condition (arrived at chiefly as a matter of political expediency) that the federal capital should be chosen somewhere within this State. Obviously suitable rainfall, suitable elevation, and proximity to a federal port all imply that the capital shall be built somewhere in the highlands which border the New South Wales coast.

If Fig. 2 be referred to it will be seen that there are several areas of

* This aspect of the control of Australian Settlement by physiographic factors is developed more fully in the writer's book, 'Australia: Physiographic and Economic.' Clarendon Press. 1910.

TYPICAL ROUGH COUNTRY IN SOUTH-WEST TERRITORY.

THE MURRUMBIDGEE RIVER.

THE MURRUMBIDGEE GORGE CUTTING THROUGH THE THARWA.

GRANITE TOR ON CASTLE HILL NEAR THARWA.

country which are less closely settled than the greater part of the littoral and highlands, and are therefore more readily transferred from the State to the Commonwealth. Purely geographical reasons all point to the southern of these areas, and indicate that the region, including the Murrumbidgee valley and the Monaro highlands, should be chosen as the capital. It lies directly on the line joining the centre of population to the coast.

One might " prophesy after the event " and imagine (what was certainly not the case !) that the authorities ruled a line from the population centre to the nearest good port (that of Jervis bay). Where this line cut the largest river at a suitable elevation (such as 1800 feet), there was to be established the federal territory. For Canberra fulfils all these conditions ! (see Fig. 2). Let us now consider the rival sites and their respective claims to consideration.

III. The Choice of the Capital Area.

By Section 125 of the Commonwealth Constitution Act of 1900, it was provided that the territory shall be situated in New South Wales not less than 100 miles from Sydney. It was further provided that it shall contain an area of not less than 100 square miles and that all Crown lands shall be granted to the Commonwealth without payment. In 1899 a State Commission inspected twenty-three sites and reported in favour of Orange, Yass, and Bombala. The latter was considered to be the most suitable. In 1903 a Commonwealth Commission examined the sites shown on the annexed plan (Fig. 4), and arranged them as follows : Albury, Tumut, Orange, Lyndhurst, Armidale and Bathurst, Lake George, Bombala and Dalgety. These districts were voted upon in Parliament, and in the next few years various sites were chosen and then displaced in favour of some other locality. Thus, in October, 1903, Tumut was selected. The Senate, however, preferred Bombala. In 1904 Dalgety was chosen. At a later stage (in 1908) a bill was introduced " for an Act to determine more definitely the seat of Government in the neighbourhood of Dalgety." The bill was passed in December, 1908, with the important alteration that Yass-Canberra was substituted for Dalgety.

It will be interesting to see how these decisions were arrived at. The northern sites—Armidale, Orange, and Bathurst—were never particularly favoured. Undoubtedly one factor in the choice was the wish of the Victorian politicians to have the city *near* to Victoria, even if it could not be *in* that state. But the final choice was limited to Tumut, Dalgety, and Yass-Canberra. The latter unattractive name was used to unite the factions supporting Yass, Lake George, and Canberra. *Yass* is not a native word, but is said to be a cartographic error for Yarra, an extremely common aboriginal term. Canberra is, I think, a real native name, though no one knows its meaning. In old maps it is written Canberry, which has an English appearance ; but many of the native names in the district are spelt with this variable suffix. The full name of the

next village is Jinin-Jinin-Derra, but it is often written Gininderry. Each of these three sites has some specially attractive features. Tumut is perhaps the most picturesque—in a beautiful well-wooded valley with a fine stream running through it. But it is not so accessible as Canberra, and perhaps rather shut in by hills. Dalgety also has a better water-supply. It is, however, very bleak in winter and rather far from the main lines of communication. The chief drawback to Canberra is the

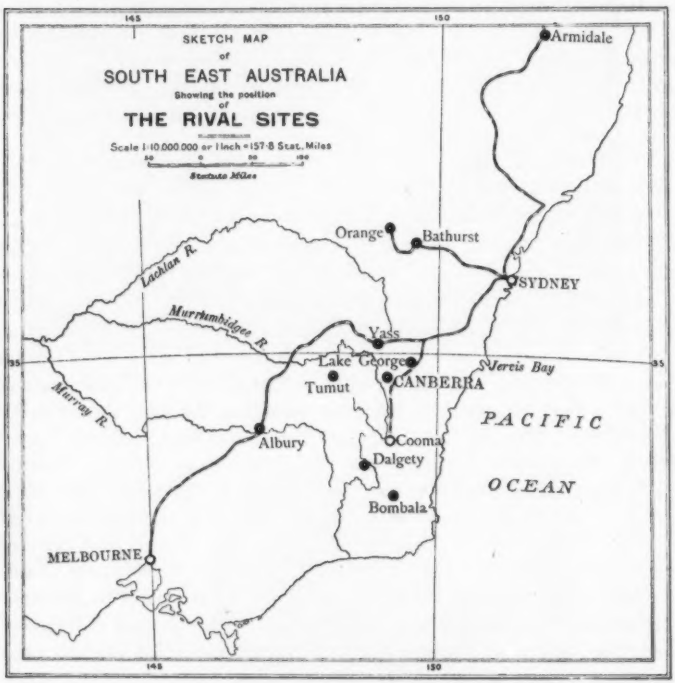


FIG. 4.

comparatively costly water-supply. It is the most accessible of the three, and the surroundings are certainly as picturesque as Dalgety, and leave more room for expansion than does Tumut. It is also very favourably situated with regard to a federal port, much more so than Tumut; while Jervis bay is probably the most suitable of the harbours available.

However, the final choice was undoubtedly due to political considerations, and the territory around Canberra was surrendered by the State of New South Wales on October 18, 1909. The territory was vested in the Commonwealth on and from January 1, 1911.

IV. The Physiography of the Capital Territory.

A. *Résumé of the Geology of the Federal Territory.*

Canberra lies in the Southern Highland region of New South Wales. This is composed of palæozoic sediments—chiefly shales and sandstones —of Silurian or Devonian age, which are often intruded by large bosses of grey granite. This is essentially the geological structure of the area set apart for the federal capital. Reference to the accompanying geological map (Fig. 5) shows that, broadly speaking, the different kinds of rocks are arranged in six belts running approximately north and south. Taking them from east to west—

(1) *The Queanbeyan shales*, sandstones, limestones, and tuffaceous beds. —These are rich in fossils, such as Cythophyllum, Halysites, Atrypa, Encrinurus, etc., and show that the beds are of Upper Silurian age. (2) *A Volcanic series* of tuffs and lavas (including some quartz-porphyries) which form the Ainslie-Majura-Gooroo line of hills. Probably these also are of Silurian age. (3) *The Canberra belt* of sedimentary rocks, which closely resembles the Queanbeyan belt. It includes some deposits of massive limestone and marble of economic importance at Acton. (4) *Massive quartz-porphyries*, probably for the most part volcanic rocks, which occupy a large area to the west and south of Canberra. They are typically developed at the hills known as Mugga Mugga (2662 feet), Stromlo and Pine ridge. They are probably contemporaneous with the sedimentary belts, and may be referred to the Upper Silurian. (5) Slates, tuffs, limestones, and *laminated igneous rocks* along the valley of the Murrumbidgee. These seem to owe their characteristic fractured features to the action of great tertiary earth-movements on the various rocks concerned. (6) *A granite massif*, somewhat gneissose in appearance, lying to the west of the Murrumbidgee. It is younger than the Silurian slates, for the latter are found strongly altered by the intrusion of the eruptive rock. Probably it forms one unit in the series of Devonian and Carboniferous granites which are so common in south-eastern Australia.

Economic Aspects of the Geology.—During the construction of the capital, large stores of building material will be required. It is therefore of great importance to know the resources of the territory in this respect. These are described in a recent report by Mr. D. J. Mahony and myself, which I have freely used in the following paragraphs.

There are four classes of rock in the territory which may be used as building stones. The *freestone* of Black mountain lies just at the north-west corner of the city area. Owing to pronounced earth-movement in the past, this stone is cracked and is not obtainable in large blocks, and this source of supply is not promising. The *granite* covers the western half of the territory. The most convenient site for quarrying operations is in the vicinity of Tharwa, 16 miles south on the Murrumbidgee. Here large quarries are being opened up. The rock weathers into tors, some 20 or

30 feet high. The rock is coarse-grained and the minerals fresh, but microscopically they are seen to be somewhat shattered. The chief minerals

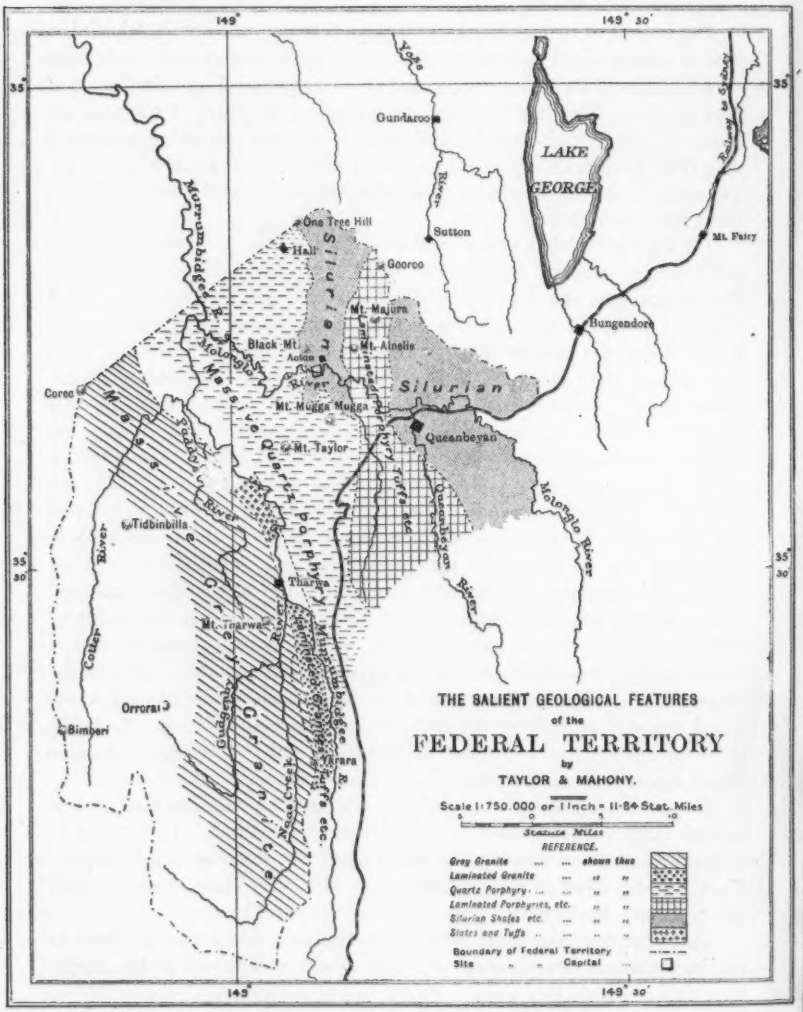


FIG. 5.

in this rock—which will undoubtedly be used largely in building the capital—are plagioclase, quartz, hypersthene, and biotite. It is, therefore, by no means a typical granite, but approaches a grano-diorite or monzonite.

THE COTTER GORGE WHERE THE WATER-SUPPLY DAM IS BEING BUILT.

RELIEF MODEL OF THE FEDERAL CAPITAL.

The *quartz-porphyries* are extremely strong and tough. They may be used in conjunction with granite and brick, but their colour is perhaps too dark to make them suitable by themselves for large buildings. The best outcrops are south of Mugga.

The limestone at Acton, when polished, forms a good dark *marble* traversed by white streaks and of an excellent texture. At Paddy's river the colour of the marble is light, often almost white. Both these could be used for interior decorations. There are nearly a score of localities in or close to the territory where *limestone deposits* occur. The most important in addition to those mentioned above are situated at Hatton's Corner (near Yass), White Rocks (near Queanbeyan), and one or two localities on the Federal Port railway. There is no lack of suitable material for the manufacture of cement, the requisite shales being abundant in the proximity of the limestone outcrops.

Brick shales occur two miles south-west of Acton, and actually within the city boundary. Another outcrop lies near Queanbeyan. Both shales have been carefully tested, and give satisfactory bricks. Thirty-five acres have been set apart, and brick works have been started in the former locality.

B. *Topography.*

(See Fig. 9.)

(*a*) *Lake George Area.*—Let us imagine the reader travelling in the train on the Goulburn-Cooma railway line. He rides along the creek known as Mulwaree Ponds (see Fig. 6), which drains into the Wollondilly at Goulburn. He is, therefore, on the eastern slope of the Great Divide. (This is a better name than the Great Dividing range, for there are many localities where this watershed is by no means a mountain *range*.) Near Mount Fairy the train ascends to 2500 feet, and is, in fact, crossing the Great Divide. But it does not reach the Murrumbidgee river system for some 20 miles. Here we enter one of those rare topographic features—an area of inland drainage. In a few miles the train descends to Bungendore, and a little to the north lies the large bare plain which constitutes the dry bed of Lake George. If we compare the land features on the two shores of the lake, we are struck with their dissimilarity. On the eastern shore the lake outline is somewhat irregular. Ondyong point, Rocky point, Currandooley, and Native Dog mark the spurs projecting from the Gourock range into the lake. In *broad* valleys between these spurs lie the streams which water Lake George: Murray's creek, Taylor's creek, Deep creek, and Turallo creek. It will be noticed that these creeks converge on the locality known as Geary's Gap.

Reverting to the western shore, we are struck by the absolute dissimilarity. Standing at the level of the lake, we seem to be confronted by a great wall extending northwards for over 20 miles from the Molonglo plain. No broad valley breaks its continuity. Indeed, to one cycling

along the foot of the Cullarin range, it seems unbroken by any definite gap, while for a large part it presents a steep face to the lake 500 feet high. From the eastern shore, however, one is able to see a well-defined gap about halfway along the western shore, where the old southern road crossed the Cullarin range. This depression—Geary's gap—was well

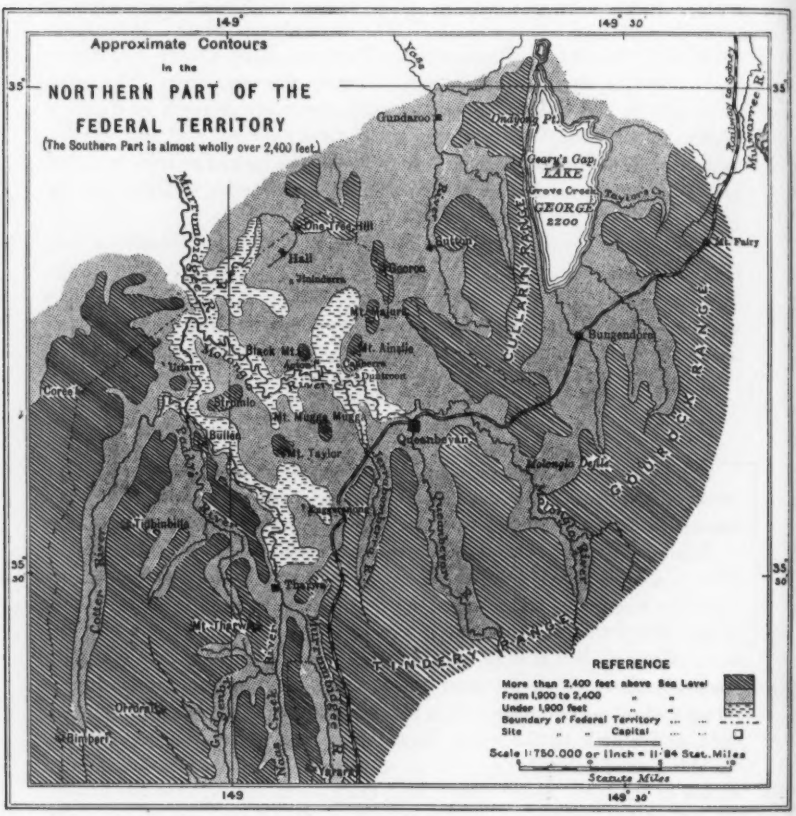


FIG. 6.

known in the days before the railway, but is now practically unused by travellers. Less than 2 miles south of Geary's gap, a stream (Grove creek) rushes down to the lake. Contrast its course with that of Taylor's creek, on the eastern shore. The latter stream flows through a broad valley, a mile or two wide, scooped out of the granite, and shows the even grade of a *long-established* river. The Grove creek is barely a mile long, yet descends nearly 300 feet. Its course is interrupted by falls 25 feet high,

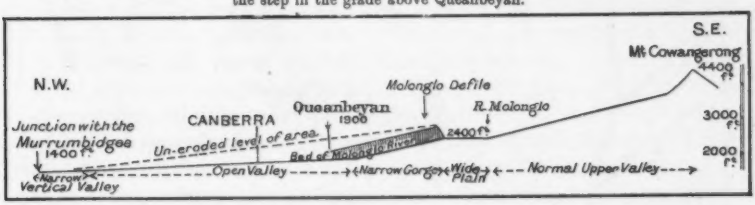
and finally it emerges from a gorge or miniature canyon with steep sides 200 feet high. Evidently it is a stream which has barely reached the *youthful* stage.

In this Lake George region, therefore, we have examples of two types of valleys, and, as we reach the Murrumbidgee, on the west of the federal site, a similar contrast within a similarly circumscribed area will be met with. The same explanation holds for both cases, and gives the key to the whole topography of the territory.

(*b*) *Molonglo River Valley.*—Proceeding west from Bungendore, which is situated in the broad plain south of Lake George, the line ascends by a rather stiff grade up the Cullarin scarp. It passes through a tunnel, and then descends to Burbong, whence it follows the Molonglo river to Queanbeyan. Let us trace the Molonglo river back (eastwards) from Queanbeyan. At the latter town it flows through open country, with no sign of a gorge, but, as we travel up its valley, the latter becomes a deep V-shaped gully, and then a small canyon, 100 feet deep. Instead, however, of reaching the source of the river, as we might expect from such a variation, we suddenly emerge on a large plain of a similar nature to that of Lake George.*

The character of the river is shown in the sketch section (Fig. 7). It will be seen that the river, instead of following an even grade from source

Fig. 7.—Profile along the Molonglo River, showing the section of the defile (hatched) and the step in the grade above Queanbeyan.



to junction, is interrupted by a well-marked step at Molonglo, with a strong slope thence to Queanbeyan. This points to some profound interruption in the normal course of the river's life. So that evidently the Cullarin range, from its effects on Lake George and the course of the Molonglo, is worthy of special study in the section dealing with the origin of Canberra topography.

(*c*) *Murrumbidgee Valley.*—From Queanbeyan (see Fig. 6) the railway goes southwards to Cooma, crossing a broad level plain, drained by Jerrabomberra creek, and then gradually ascending towards Michaelago. Two rapid curves, near Tuggeranong, carry the line up to 2500 feet, and here we get into the main valley of the Murrumbidgee river.

* The absolute level of this plain and the surrounding contours indicate that it is a land-locked basin like Lake George, with a *lower break*, however, to the west.

Here we notice a strong difference in the character of the two banks of the big river. Just as at Lake George, the eastern shore is low and undulating, but the western is abrupt and continuous for many miles. Even the rough contours shown in Fig. 6 demonstrate this. The western margin of the Cullarin range is similar to the even margin of the Bullen and Yarara ranges. The normal *lobes* of the Gourock range are similar to the lobes projecting from the Tindery range. Those tributaries of the Murrumbidgee which cut through the Bullen-Yarara range emerge through gorges several hundred feet in height. So that the sites suitable for weirs lie just where the tributary streams of the Murrumbidgee cross this pair of abnormal ranges. On the east of the capital site is the Molonglo defile, on the west of the site the lower waters of the Cotter and Naas-Gudgenby streams.

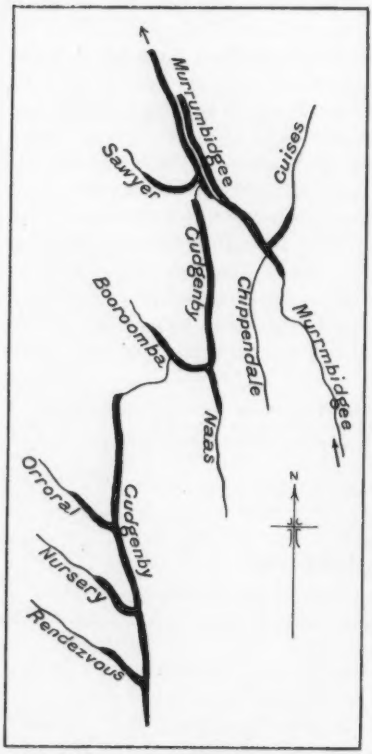


FIG. 8.—Some of the "boathook bends" on the Upper Murrumbidgee and its tributaries.

(*d*) *The Tharwa Gap.*—A little south of Tuggeranong is the village of Tharwa (Figs. 6 and 9), where there is one of the few bridges across the upper Murrumbidgee. To the north is the wide valley, with its steep western slope, already described. But to the south the mountains close in, and a most interesting set of physiographic features is presented to us.

The contours of the various tributaries of the Murrumbidgee are here quite at normal. If a normal river valley be dammed, the water-line (which is a contour) has the form of a "fork" with two or three prongs. But in the region around Tharwa, on the Murrumbidgee, many of these tributaries run into the main river in the wrong direction, *i.e.* they run upstream. For instance, in Fig. 8, the Gudgenby, Naas, and Chippendale tributaries are normal. But Sawyer's creek, Booroomba creek, Guises' and Deep creeks are all heading upstream, and, as we shall see later, this characteristic is even more strikingly shown in the more southern tributaries. Hence a contour of these branches is not a "fork," but resembles a "boat-hook." In Fig. 8 these features are emphasized.

(*e*) *The Canberra Plain.*—Let us leave the question as to where the ancient watershed between the Snowy and Murrumbidgee lay, and return to the topography nearer the Canberra site. To the west of Queanbeyan, which is situated at the foot of the Jerrabombera ridge, the valley opens out very greatly, and, in place of hilly or undulating country, such as we have examined so far, the landscape consists of isolated knobs, or, rather, series of knobs, rising from almost level plains. This is shown clearly in Fig. 6. There are five very striking knobs surrounding the proposed city area. Ainslie (2762 feet) to the north-east, Black mountain (2658 feet) to the north-west, Mugga (2662 feet) to the south, Taylor (2800 feet) and Stromlo (2600 feet) to the west; all rise about 800 feet above the Canberra plains. These cones quite resemble volcanic cones, such as those which add so to the picturesqueness of the city of Auckland, N.Z., but they are merely "residuals" (monadnocks) of an older land surface of about 3000 feet level. They consist of hard rocks, usually an eruptive rock allied to diorite, but containing much free quartz, and, therefore, better known as porphyry. Black mountain is chiefly quartzite, an altered sandstone, which may have been hardened by the eruptive porphyry. It must be clearly understood, however, that the volcanic action implied by the presence of the porphyry is of very ancient date, and has had no direct effect in producing the topography now existing.

The detailed geology of the district is now in course of investigation, but it seems very probable that the very regular arrangement of the tributaries of the Molonglo is due to some structural arrangement of hard and soft strata. The strike of the rocks is almost north and south, and it is known that there is an alternation of limestones and sandstones in the district. Little tributaries, cutting the sides of these north-south ridges, have converted them into the picturesque features and oval cones under consideration.

(*f*) *The Canberra Monadnocks.*—The uniform height of these knobs, as already stated, points to their being the relics of an old level land surface of the nature of a "peneplain." This is the name given by geographers to a large tract of country cut down by river erosion to a fairly uniform level (*pene*=almost), but composed of varying rocks, and not of one class of sediment, like a true plain. On a small scale, the bed of Lake George is a true plain, and not a peneplain, for it is the level surface of a homogeneous silt deposit, and is due to the constructive action of rivers, rather than to the destructive erosion which carves out the level peneplain. A peneplain consisting of rocks of varying texture all worn down approximately to sea-level, might later be raised up several thousand feet. Then the rivers would start cutting out fresh valleys, and would naturally leave the harder rocks, which would for a long time preserve the general level of the preceding land surface. These hills are termed *monadnocks* by geographers. Something of this nature has probably given rise to the knobs of Ainslie, Mugga, Taylor, etc., but till the

geology of the territory is more fully investigated, this cannot be satisfactorily proved.

(*g*) *Trans-Murrumbidgee Area.*—To the west of the Murrumbidgee the character of the country changes somewhat abruptly. There are no flat plains with isolated knobs, but restricted valleys bounded by high mountains rising to 4000 or 5000 feet. The Cotter river is an extraordinarily long

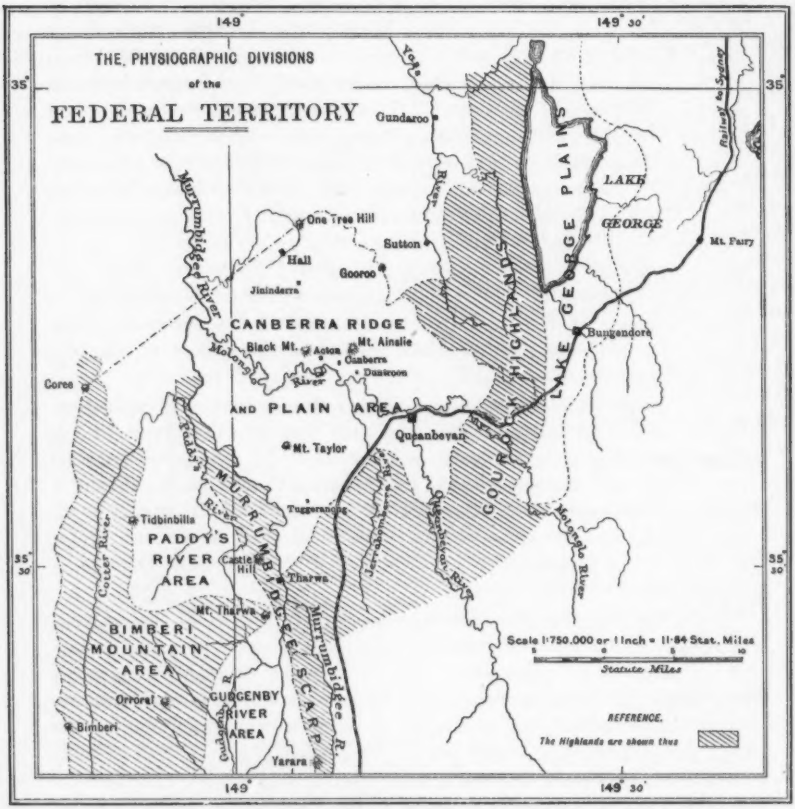


FIG. 8A.

"gash," probably, as Professor David has suggested, correlated with an adjoining area of uplift. The lower portions run through precipitous gorges, while Paddy's river, which occupies a comparatively open valley at its head, also enters the Cotter (near its junction with the Murrumbidgee) by gorges 100 feet or more deep. (To the south the Gudgenby basin (see Fig. 6) resembles that of Paddy's river.) Further to the west again, surrounding the valley of the Cotter, are the high ranges whose summits,

Coree (4657 feet), Tidbinbilla (5151 feet), Orroral (5266 feet), and Bimberi (6264 feet), are among the highest in Australia. Indeed, the territory reaches within 60 miles of Kosciusko, and includes a cluster of peaks over 5000 feet high, in addition to those mentioned.

(*h*) *Summary.*—Summarizing the topography of the territory and adjoining areas, we may classify it under six heads, which are shown in Fig. 8A :—

(1) Lake George plains, at about 2200 feet elevation. (2) The Gourock highlands, rising to 3000 feet within the territory, but reaching 3500 feet further to the south. (3) The Canberra " ridge and plain " area consisting of ridges, of 2600 feet elevation, alternating with plains of some 1800 feet. (4) The Murrumbidgee scarp (Bullen-Yarara), an isolated ridge rising to 3084 feet at Castle hill, and 4068 feet at Yarara, to the south. It extends from McDonald, in the north, along the west bank of the Murrumbidgee, to the southern limit of the territory. (5) A broad belt of country, separated by the Old Divide, at Tharwa, into the (northern) Paddy's river area, and a (southern) Gudgenby river area. It is characterized by continuous rounded ridges and moderately broad valleys ; save where the two tributaries empty into the Murrumbidgee where gorges replace the broader valleys. (6) The rugged mountainous area in the west of the territory. It is traversed by the deep gorge of the Cotter. The highest point is Bimberi (6264 feet), which is part of the Kiandra plateau. Translated into physiographic language, we may classify the features as follows :—

1. Lake George Plains	Infantile, undissected country below base level.
2. Murrumbidgee scarp and Cullarin scarp	Showing youthful features with moderately deep gorges.
3. Gourock highlands, Paddy's river area, Gudgenby area	Mature valleys, well-defined rounded ridges
4. Canberra plains	More mature stage of erosion, with big flood-plains and relics of older land surface preserved as knobs.

These are shown on Fig. 8A.

(*To be continued.*)

RELIEF IN CARTOGRAPHY.*

By Captain H. G. LYONS, D.Sc., F.R.S.

Relief indicated by Colour.—In its simplest form coloured shading is used to indicate the shadows which inclined illumination from a determined direction would cause in the region represented. Minor features, such as spurs, are accentuated by selective colouring, one side being more darkly

* Continued from page 248.

tinted than the other. Steep slopes are strongly coloured, and undulating ground is lightly tinted to indicate its form and character. In this way, the relief of the country is well shown, while at the same time the contours are not obscured, but remain clearly visible, and give a distinctive character to the map.

The new French maps, 1 : 50,000, and the Swiss Siegfriedkarte, 1 : 50,000, coloured edition, show this method at its best. Very similar results, but produced with more skill and care by the methods of "half-tone" reproduction, are used to emphasize the relief in the maps of some countries. In France, the maps on the scale of 1 : 50,000 are thus shaded in grey on sloping ground; in England, the maps on the scale of 1 : 126,720 of an earlier edition, besides having the altitudes shown by layers of colour graduated in tint, exhibit this form of shading to emphasize relief, but this has been omitted in the latest edition.

The Swiss cartographers have produced some very beautiful maps by the use of colour to indicate the form of the ground, in which modelling of form is represented with the aid of inclined illumination as opposed to the modelling of slope which vertical lighting gives more accurately.

Kummerly & Frey, of Berne, have published a number of such maps, in which special pains have been taken to obtain an effective relief effect. Not only have strongly contrasted spectral colours, reddish-yellow and green, been used for the illuminated and shaded slopes respectively, but a mauve tint has been deftly employed to reproduce as far as possible the haze effect due to looking through a slightly turbid medium, which is so characteristic of valley landscapes and low-lying ground. Under such conditions distant bright objects appear darker and dark objects seem to be somewhat lighter, so that the general result is to reduce the contrasts. The contours are shown in red, and the illuminated slopes are of a reddish-yellow tint; the reverse or shaded slopes are coloured partly in green and partly mauve, the latter being employed for the parts that are most in shadow. Valley floors are also green. The result is to produce a very strongly marked relief effect, though in consequence of this the relative altitudes of points and the degree of slope of different portions are less precisely rendered. For wall-maps and tourists' maps, however, this method is very effective, and it is for these that it is mostly employed. The result of employing the reddish-yellow on one side and the green and mauve on the other is to produce the optical effect that the illuminated slopes seem to be somewhat convex, while the shaded ones have a more concave appearance. With so much colour, a large amount of detail cannot be easily combined, but the mountainous character of the Alpine regions is very well brought out.

In 1895, Pauliny proposed a new method of representing relief by employing colours, and a map of the Raxalp and Semmering, near Vienna, has been reproduced on the scale of 1 : 37,000, according to his scheme, by the Geographical Institute of the Austrian army. The map

is printed on a grey ground on which certain details are left white, such as the main roads and rivers, and part of the contour-lines. On this the different information is printed in black, yellow-green, dark green, yellow, red-brown, and blue. The guiding principle is that objects are differently coloured according as they are on the illuminated or shaded slope, and in pursuance of this, contours are shown in white on the former, and red-brown on the latter; similarly, woods and pastures appear in yellow-green and dark green; cultivation, yellow and red-brown; while main rivers are white, streams blue, railways black and white, footpaths are shown by black dotted lines on white dots. The relief effect is well shown, but small detail is not readily recognized. The system is not now in use.

Omitting such maps as cadastral maps on very large scales on which the relief is not usually represented, we may summarize the most suitable methods for topographical and geographical maps, and for those on still smaller scales such as are included in atlases.

On the larger scales of topographical maps 1 : 10,000 and 1 : 25,000, contours are most frequently employed and are always the most satisfactory. In the 1 : 25,000 maps of Austria they are used together with hachures and vertical lighting, but in moderate ground the effect is not so good as might be desired. In the next smaller scales represented by maps 1 : 50,000 and 1 : 100,000, contours and hachures are both conveniently used, Great Britain, Switzerland (Siegfried Atlas), and the United States furnishing examples of the former and the Dufour-Karte of Switzerland of the latter. Inclined lighting is used with advantage on these scales both with hachures and in shading of contoured plans, this being particularly effective on these maps. Bands of colour to supplement contours are not really effective on these larger scales, for no relief effect is usually attainable until the smallest scales of topographical maps, *i.e.* 1 : 150,000 and the geographical maps from 1 : 200,000 to 1 : 1,000,000. Here contours alone have become rather generalized, and hachuring shows little more than ridges and valleys without bringing out the general relief of the region. In geographical maps of from 1 : 500,000 to about 1 : 2,500,000 contours, except as boundaries to colour bands, give but little idea of form, and in these maps the altitude of different surface features is a more important feature than the slopes and minor details of the relief. Colour with or without hachuring of a conventionalized type is a satisfactory means of expressing this. In atlas maps the finer forms of mountain shading can alone be used, and this is but a conventionalized form of hachuring, since the details can no longer be shown.

Passing to the different purposes for which maps are prepared, these too have to be considered in selecting the most suitable means of expressing relief. Wall maps are best served by the use of a graduated colour scheme in which shading or hachuring is used to emphasize all features of specially contrasted reliefs. Map series which include a large region in many sheets are usually on a fairly large scale, so that here contours supplemented by

shading and inclined illumination are the most suitable. Maps for military purposes are now mostly contoured, with the relief emphasized by colour or shading or both, since they are restricted to maps of large or moderately large scale.

Countries and regions which are still but imperfectly surveyed are best expressed by form lines on topographical scales and by shading under inclined illumination on geographical maps.

No general statement can be wholly satisfactory since maps are required to fulfil such varied purposes, and while absolute or relative height may be of primary importance in some cases, the form of the surface, sharp contrasts of hill and valley, passes in mountain ranges, isolated features, may all in turn demand special emphasis. It is certain, however, that when surface relief has to be expressed in the fullest manner, this will generally entail a reduction of the detail which denotes human settlement and communication. Thus, a thoroughly satisfactory representation of an area or region in all its geographical aspects cannot be obtained in a single map, but several may be needed. These will not be sharply differentiated as "physical" and "political," but some of man's relations to the land surface will be best shown on an orographical map, while others can be satisfactorily represented on a two-dimensional plan.

Sir THOMAS HOLDICH: I think you will agree, those of you at any rate who have read Captain Lyons' paper, as well as heard his remarks, that it is a most masterly summary of a very difficult technical subject. As he has said at the beginning of his remarks, it is not a new one. All these matters have been discussed for some time past, and it is certainly very desirable now that there should be some consensus of opinion as to how relief in cartography should be expressed. But there must be many gentlemen here who are prepared to offer remarks on the subject, and we shall be glad, first of all, to hear what they have to say. Amongst others we have here Colonel Burrard, who, as Surveyor-General of India, is responsible for the production of a large number of important maps. Perhaps he will kindly say a few words.

Colonel S. G. BURRARD: Captain Lyons' paper deals with the most difficult subject in cartography. All nations and geographical societies are now dissatisfied with maps. All are experimenting to try and improve relief. Captain Lyons has shown clearly the present position: he has shown that we are in doubts and dilemmas, and that our systems of relief vary with scale and purpose. I know well the work entailed in preparing an historical account of a long line of research, and I feel much indebted to Captain Lyons for his paper. I hope that it may be published, so that it may be studied by many cartographers.

Will you allow me to discuss the immediate future from the point of view of progress. I shall not take into account special maps for special purposes; I shall only refer to first-class maps prepared for general purposes of geography, such as, for example, the International 1 : 1,000,000 Map. Captain Lyons has shown that in the past there have arisen two great rival systems of relief: the scientific and the artistic. The scientific is that of contours, and its aim is truth; the artistic is that of shading, and its aim is not truth, but the conveyance of impressions. The impressions concerning the heights of mountains, and the steepness of slopes that are formed by

pedestrians, are not in accordance with truth. The two systems have given rise to different schools of thought.

Now, the system of colouring a map by layers is only an extension of the scientific system of contours. Layer colours are merely a means of emphasizing the main contours. Captain Lyons says that layers give a true foundation to the map. I agree with this view. Contours alone, though they may be true, do not bring out the main broad masses of relief. The addition of layer colours to contours is a great step forward, and we owe a debt to the Committee of the International Map for their influential support of the layer system. Their support has given to the layer system a hall-mark, and has put cartographical relief upon a scientific basis.

Unfortunately, the layer system cannot show all minor details of relief. It shows the broad masses; but if a layer colour covers all the ground between 1000 and 2000 feet high, then the peaks of 1500 are not emphasized by it. Take the plateau of Tibet: we have flat plains 15,000 feet high, but our layers omit to emphasize a range of 16,000 feet high that is protruding 1000 feet above the flat plains. The strategist will say, "This protruding range of 1000 feet is a more important obstacle to me than the 15,000 feet altitude of the plateau." So it is evident that we must supplement the layer system, that we must add to it the minor details of relief. Instead, however, of building up upon the layer system and trying to perfect that system, we have added a loose hill-shading to layer maps, and in doing so we have lost much of the progress that had been made.

Suppose you have two maps of the same area: firstly, a layer map without shading, and, secondly, a map with hills shaded, but without layers. In order to supplement the layer map, the hill-shading of the second map is now printed over the layers. To my mind this course is indefensible. In the second map the hill-shading has been drawn on the assumption that the hills are standing up above sea-level. In the combination map this hill-shading, that represents perhaps 10,000 feet above sea-level, has been printed upon layers which already represent 10,000 feet. I put forward the following proposition for your consideration: the hill-shading that is to be added to a layered map must be everywhere made supplementary and subordinate to the layers. I was having an argument on this subject with a draftsman who was showing me a map of India printed in layer colours with heavy hill-shading printed over the layers. I said to my companion, "The artist who did this hill-shading was unaware of the fact that it was to be printed over layers." My companion replied to me, "The hill-shading has to show different ranges varying in height from 1000 to 29,000 feet, and if Mount Everest is to be shown as a great peak, the hill-shader must be allowed to utilize all the artistic means in his power." Now, in my opinion, the hill shading is not intended to show Mount Everest as a great peak; it is not intended to show 29,000 feet. The layers show that Mount Everest is standing upon a base 25,000 feet high, and all the hill-shading has to do is to show that there is a peak standing 4000 feet above the 25,000-feet layer base.

These differences of opinion have arisen because hill-shading is utilized for two very different purposes. Its first purpose is to indicate those minor hill details and rock outcrops which, though important, are too small to be shown by contours. The second purpose is to give a pictorial idea of relief to the map as a whole. Public opinion favours the pictorial, not for any geographical reason, but because people like a pretty picture. I have analyzed a great number of maps, and my opinion is that the price paid for the pictorial idea is too high. The price we pay is this: firstly, we add to a scientific map a system of relief that is unscientific; secondly, the hill-shading in nine cases out of ten detracts from the value of the layers by obscuring them. We are thus subordinating the scientific to the pictorial; we subordinate the broad masses to the minor details.

The progress of cartography requires us to perfect the layer system and the layer colours, and to keep hill-shading secondary and subordinate. When a poet writes bad grammar, he pleads poetic licence; when a painter exaggerates effects, he pleads artistic licence. But astronomers and geologists do not recognize scientific licence. If cartography is to progress, its aim must be truth; it must cease to depend upon licence.

Prof. HERBERTSON: Captain Lyons began his account of the progress of cartography when it had ceased to become mechanical drawing, when it attained a scientific aim, and attempted to depict not merely lines, but surfaces, and so faced the problem of the third dimension, the expression of quality and not simply of quantity. This quality can be expressed in two ways—scientific and artistic. For the scientific representation of relief there is no doubt that close contours for equal intervals are the simplest and most important in the large-scale maps, but I do not see why we should rule out of account true hachuring which is equally scientific, as it shows the true slope. For scientific purposes we may easily combine a hachured map and a contour map. This is good so far as it goes, but a form can be expressed artistically as well as scientifically. It cannot be merely mechanically drawn; for the smaller-scale maps at any rate it must be generalized, and for such maps there must be generalization even in contour-lines. The artist has a power of depicting salient features vividly, and he ought to be allowed to do so, both in line and colour.

It is very difficult to discuss in a few minutes this vast problem, because there are many requirements for which we wish maps. Unfortunately, in many maps we try to meet far too many requirements. What we need is more editions of maps. There is no reason why a small edition of the International Map should not be printed without any names at all. It would be invaluable as well as extremely effective. I have used such prints of the half-inch Ordnance map and Bartholomew's half-inch map, and find it possible to examine forms with a detail and certainty almost impossible on the map with names. There is no reason why two editions should not be printed of such maps, and the same price charged for sheets of both.

The question of shading cannot be discussed without psychological as well as artistic considerations. The beautiful 1 : 200,000 wall-map of Switzerland, I understand, owes its success not merely to the scientific geographer, but also to the artist. It is in many ways much more graphic than any model of Switzerland, and for teaching purposes it brings out the features more clearly than any other map I know. But we have not yet devised an effective system of mapping the different types of land forms, and also of showing their relative height above sea-level on the same small-scale map. The whole question of the symbols to be used for the different types of land forms on such maps seems to me to require discussion. I will not detain the meeting by attempting it, but must before sitting down thank Captain Lyons for his admirable paper.

Colonel W. C. HEDLEY: We are much indebted to Captain Lyons for bringing up this subject. He has shown us maps in every variety of style. I think there is a tendency to make maps too complicated, and, in my opinion, contours are sufficient for most purposes if the interval between them is sufficiently small. There is no clearer map, for instance, than the series published by the Geographical Section of the General Staff, on which the contours are at 100-foot V.I. on the 1 : 250,000 scale. The maps we have been shown to-day require a very high degree of skill if the results are to be satisfactory. They are the work of the best cartographers in the world, and my advice to countries who have most of their topography before them is to confine themselves to contours, unless their draftsmen, engravers, and printers are very highly skilled. As regards the International Map on the scale of 1 : 1,000,000, I agree with Colonel Burrard that a layer map of the world on that

scale would be very valuable for many purposes. I think, however, that the addition of hill-shading would be an improvement for soldiers, travellers, and for the ordinary individual using a map. I should like to see two editions, one with layers only, and one with hill-shading added. The second edition would not involve great expense. It would merely mean the addition of one extra plate to those used for the first edition.

Prof. W. M. Davis: Allow me to emphasize a matter which is probably presented in Capt. Lyons' printed text, but is not mentioned in his communication, namely, the work between the land outdoors and the printed map which we ultimately receive. The surveyor is on the land, and he brings in, as a result of his work, certain marks on a sheet of paper. We do not see those marks; we see something more or less modified from them. His lines are usually drawn in pencil; they have to be gone over in ink, and in that process there is nearly always more or less obliteration of certain delicate details, which the cartographer may have had the skill to see and to represent. The least departure from the original record will be made in the case of a contour-line map, drawn on the ground and very carefully copied in publication. On the other hand, when it comes to representing relief by shading, that, I believe, is very rarely done on the ground by the topographer; it is nearly always done at an intermediate stage between the ground and the finished map by the draftsman or the lithographer, who has very seldom seen the ground himself. He must interpret the topographer's record and transform it into such style of shading as he adopts. He nearly always fails to bring out certain sharp details, and gives an impression of soft forms that is incorrect in forms of sharp angles and cliffs. The new sheet of the Killarney district illustrates this difficulty. I believe the man who shaded that beautiful map—beautiful in the sense of a delightful picture—was not on the ground with the topographer, and therefore did not have direct sight of the forms he was to represent. I happen to have walked, two years ago, through the Gap of Dunlo, and on looking at that part of the map, I find that the cliffs are very much less perfectly represented than the gently rounded slopes of the neighbouring mountains. Therefore, between a careful survey on the ground and a beautiful publication in our hands there is a considerable danger of inaccuracy in the interpretations of a lithographer who has not seen the ground, but whose work, when it is printed, is quite as impressive as any lines drawn by the original surveyor. One of the greatest difficulties, therefore, is to have the matter of interpretation by the lithographer who has not seen the ground correctly done. The maps of our United States Geological Survey are now produced in contours in the field by the topographer; then the contours are carefully reproduced on the printed map, so that there is as little as possible interpretation by the lithographer who has not been on the ground. A contour-line map thus produced is therefore an accurate map. It may not be so beautifully legible as a tinted map of Lake Lucerne, or a shaded map of the Killarney district, but it avoids the element of interpretation by the lithographer who has not seen the ground. In the coloured maps of the Ordnance Survey, of which Snowdon is an excellent example, the hachures were, I presume, not drawn on the ground, and some of the sharp cliff-edges seem to me too much softened in the printed map. That is an effect of interpretation which I think is unfortunate. I also regret very much that, on the Ordnance maps of a scale of 1 inch to the mile, only 100-foot contours are printed. Truly only these lines are surveyed, but the surveyor on the ground is a skilled observer, and he might, with great advantage to the reader of the map, sketch in 25 or 50 foot lines. The public can be informed that the full red lines are surveyed, the dotted red lines are sketched; no one is deceived. Permit me, in conclusion, to express my gratification that a certain phrase used by the first

speaker was introduced without explanation, as if it were perfectly orthodox—namely, a maturely developed surface. It is encouraging to see that the use of such explanatory phrases is gaining ground, even in this room.

Admiral Purey-Cust: I have not had an opportunity of hearing Captain Lyons' lecture, or of examining the maps, so I cannot criticize what has been said. I can only make a few remarks on how the subject appertains to the Admiralty Charts. These are, of course, looked at from quite a different point of view—whereas maps are mostly used to find the way about on land, charts are almost entirely used to find the way about on water, so we do not want all the detail that is required on maps of the land; we are well content to clearly delineate the features of the hills so that they can be readily recognized by the sailor when he sees them from the sea, paying particular attention to all prominent summits and the heights of them. The use of colour on the Admiralty Charts is not at present practically possible, and we should propose, if we used it at all, to use it for the under-water depressions rather than the above-water elevations. We have always contented ourselves with black and white; all hillwork was originally shaded by vertical hachures, but horizontal shading lines were adopted later principally on the score of expense; at other times we have used contours only, and lately contours with the addition of shading on the dark side of the hills (light from the north-west corner of the sheet), which has been done by stippling on the copper plates, and is very effective. I have brought a few specimen charts here of the different shadings we have adopted from time to time.

Mr. William Stanford: There is one point which I notice, and that is, that you all have spoken almost entirely of large-scale maps. Some of us who have to make maps, chiefly school maps, which go very largely into the elementary schools not only of this country, but of the United States, are to-day looking to this committee for a lead as to what in their opinion is an ideal school map, how it should be coloured, and how it should show the various physical features. It can either be the conventional map coloured politically, *i.e.* to say, if the map be a continent, showing the international boundaries, or, if the map be a country, the boundaries of the respective Local Government areas, whatever they may be. Or it can be, and there seems to be little doubt that it should be, a contoured map; but it is more difficult to decide what is the best contoured map, and what is the best scheme of colouring. There seems to be some doubt amongst many that I have spoken to as to whether the scheme propounded by the International Map Committee, a combination of browns, greens, pinks, is the best. I know that some claim that all the land features should be shown in browns. There is also the question whether on a contoured map the actual ranges should be indicated by hachures as they are in most of the German school maps. This question of school maps deserves special consideration from some of the speakers who are or have been Engineer officers, as there can be no doubt, in the future even more than in the past, the world surveys will be completed very largely by men who have been trained in this branch of the military service, and it would therefore be to the advantage of those men in the earlier part of their career if they had been brought up in the elementary school on maps and atlases which were based on the lines which they would follow out (though, of course, in much greater detail) in their subsequent careers. I shall be especially interested to hear what Prof. Davis thinks of this subject of school maps, as at present a very large number of school maps in use in the United States are made in England or Scotland. I feel sure that all we map makers are only too willing to follow any good lead that may be given us by such an authoritative body as this committee, but to-day we are confused by a multitude of counsellors—one says no greens, another all browns, and another green, brown, and hachures.

Mr. H. O. Beckit: I wish to join in the thanks to Captain Lyons for the very full and useful statement he has printed of the most urgent and difficult of all cartographic problems. There seem to be three requirements in its solution, which may perhaps be set in this order: (1) accuracy, (2) legibility, (3) beauty. I should like to make a few remarks about the second. Captain Lyons has pointed out how the amount of other detail to be shown seriously affects the legibility of the representation of relief on a map; but is it not true that in the relief methods by themselves an attempt is being made to satisfy two distinct sets of people—the general public and the practised map-user—and also two quite different uses of the map, that made in a general and perhaps distant inspection on the one hand, and close detailed examination on the other? For the former, some degree of plastic effect and discrimination of principal from minor features seems necessary; for the latter, the smaller forms must not be obscured. I suspect that neither these two publics nor these two uses can be really satisfied by one and the same article, and that we need an otherwise unfortunate multiplication of maps, not merely on different scales, as Captain Lyons points out, but even on the same scale in different styles.

Turning for a moment to a matter of detail, related chiefly to the production of large-scale topographic sheets, I should like to ask whether the employment of colour printing, in itself very welcome, is not being carried a little too far. We find cases where colour has been applied in three and four, if not five, distinct ways to show relief alone; and one is tempted to doubt whether in practice the results are likely to compare very favourably, for precision of execution, with the old black-and-white methods.

Sir Thomas Holdich: This is no doubt a large subject, and one on which there may be a great variety of opinion. I have no remarks of my own to add except just this, that after having seen the great variety of maps, and the different schemes of colour presented on that screen in illustration of Captain Lyons' lecture, I think it is quite time that there was some consensus of opinion as to what particular shades of colour should be adopted in order to represent relief. I cannot see that this presents any very great difficulty. We all know the ordinary little maps which are used when we are wandering about the country, motoring or otherwise, which are turned out by Bartholomew, and which are printed in certain colour-shades. The public are gradually getting educated to use these maps intelligently. I agree with Colonel Hedley that we should consider the utility of maps for the people who are going to use them, and make them easily intelligible. As the public are getting used to those maps, and are making, I hope, a considerable advance in the knowledge of geography through them, I should suggest as the basis for adopting a general scheme of colour that the colours utilized by Bartholomew should be adopted. I have seen some colour schemes on maps which seem to be hardly short of outrageous. I have seen a wall-map in which the mountains grew darker and darker as elevation increased, and finished, not with a white snow-capped line of peaks, but with a furious red colour on the top, indicating, apparently, that they were in a state of eruption. This seemed to me entirely wrong, particularly in regard to wall-maps used for educational purposes. Some decision should be come to as to what the system is to be, because children will grow up with their minds confused if relief in maps is presented to them at one time shaded from light to dark, and the next time from dark to light. We are all of us much indebted to Captain Lyons for the way in which he has put the case before us. We know a great deal more about it now than we did before his lecture, and certainly, in his paper and in his remarks, he has left us a great deal to think about. Before asking Captain Lyons to reply to any criticisms that have been made, I would ask you to join in a vote of thanks to him. I would also include thanks to Messrs. Zeiss for their demonstration by the epidioscope, and would ask you after

the lecture is over to inspect that excellent apparatus for illustrating maps on the screen.

Captain Lyons: The discussion has shown what is really the essential point, that in all the larger scales we want contours as liberally as possible, and as accurately as they can be drawn from the observations on the ground. I do not know whether I understood Dr. Haverfield rightly as urging as a disadvantage that the line of a contour may miss by a few feet above or below a feature of importance. That only comes to what Prof. W. M. Davis has said, viz. that there should be as many contours as possible, and that those should be drawn on the ground. I was much interested in what Colonel Burrard said, that for the basis of the smaller-scale maps at the present time the most suitable thing seems to be to trust to the layer colouring for the absolute altitude, and some form of hachure or colouring for the relative altitude. Regarding Sir Thomas Holdich's remarks, need we always be bound by what the public is used to, because these layer maps were started as an experiment in scientific cartography, and after some twenty years they are found to be exactly what the public want? Dr. Haverfield's difficulty about some features disappearing on the small scale is inevitable. You cannot work out a single area on a single scale, and maps on different scales must be used. Maps are not valuable things to be put away in presses, but are pieces of paper to be used up in the course of work and then replaced. With regard to Mr. Stanford's point, I should like very much to see a demonstration and a discussion on the subject of wall-maps, which raise the same questions from a somewhat different point of view, because these are much more of the nature of a diagram than of a map, and the questions of colour, of what colour, and of the position of the colour, come in. That is another large subject and one which it is impossible to touch on at this time of the evening, but I think the Society could do a great deal by arranging for a serious discussion on this very important subject.

The following letter was read from Dr. Haverfield:—

Oxford meetings—a too common ailment—forbid my attendance at the Geographical Society on November 20. But I am greatly interested in the subject to be treated by Captain Lyons, and the proofs of his paper, which I have read, increase my regret that I cannot be present. I send instead a few remarks on one part of his problem.

There is, of course, no absolutely best way of showing relief in cartography; a "mathematically correct reproduction of the Earth's surface" is, strictly speaking, impossible. Each worker has to follow the methods which yield the greatest accuracy and greatest clearness for his own purpose; he must consent, at least tacitly, to ignore certain features and to repair the omission by conventional devices which best suit his own end. I have been mainly concerned, in such geographical teaching as I have attempted, in setting before students of Ancient History the geographical factors which have conditioned the culture, trade, or frontier strategy of the Roman world—and I include in these the factors which might have been expected to affect Roman History, but which for some reason did not. These features I have had to explain to largish classes of eighty or one hundred, most of whom know very little geography—not even that old-fashioned topography of where certain places are, which used to be thought geography. My excuse for these notes is that (as I imagine) a great many other teachers are giving similar lessons in applied geography to non-geographers, and though their work may not satisfy the purists of our Society, it nevertheless does a great deal of good to the learners and arouses an interest in and a knowledge of more advanced geographical studies.

My material falls naturally into largish blocks—for example, the Roman frontier on the Rhine in its strategic aspects; the relation between the physical conditions of the Spanish peninsula and its political divisions, civilization, and trade in the Roman period; or, the military and commercial relations between the Mediterranean and the Danube frontier. To explain such things I have sometimes used large wall-maps, as supplied by our School of Geography, which does a great deal to help geographical teaching in Oxford outside the limits of its own special lectures. Unfortunately, wall-maps grow dim in the distances of large rooms, and they are easily forgotten afterwards. Sometimes I have used slides, but the true value of slides, I think, would be, not to show maps, but to show typical landscapes, —and these are hard to get. Most often I have used small hand-maps, prepared for me by some cartographer (I have tried several in the last dozen years), distributed to the audience, and commented on in the lecture. These maps are on small scales—1 : 5,000,000, or even less; they show only a few features, with space for the audience to write others in; they indicate relief by contour colours mixed with caterpillars, and (obviously enough) they have to be done very cheaply, that is, very roughly. They have, however, given me a certain experience in methods of indicating cartographic relief for classes such as mine. I would urge the following points:

First, the only good results are given by maps which combine coloured contours with hachures. Colours are not enough by themselves; the Earth is not laid out in steps or terraces. No doubt, if you can use many colours, some good can be done by them alone. I have before me an admirable map of Asia Minor and North Syria, on the scale of 1 : 2,500,000, prepared by my colleague, Mr. J. G. C. Anderson, who knows much of the country himself, drawn by Dr. Bosse, and issued by Mr. Murray. In this, only colours are used, yet the physical features stand out clearly. But then this map contains, including the blue sea, fourteen distinct shades to get up to 12,000 feet, and though this does not mean quite so many distinct printings, the cost is very great, and the method can never be used widely. The alternative is a use of hachuring which may here and there serve instead of several shades or colours.

Secondly, with coloured contours it is necessary—perhaps more necessary than Captain Lyons has actually pointed out—to choose your contours with great care. I have in mind another map of Asia Minor, prepared with a very few colours, in which the contours selected were so unsuitable that the peninsula looked like a flat plain. Everybody has seen similar misrepresentations of other countries. It is not really so very easy to avoid these misrepresentations, if you wish to be mathematically accurate. Here, as in many other matters, *summum jus, summa injuria*. The "mathematically correct reproduction of the Earth's surface" is inaccurate. I incline to think that coloured contour layers ought not rigidly to follow definite contour-lines. They are really quite as undefined as the horse-power of motors. Instead of drawing on your map a hard line—as one does for example in England, of 600 feet altitude—the line should be rather "plus or minus 600 feet," say 560-640 feet. Where the ground a little below 600 feet belongs practically to the ground that is above it, it should be included in the latter, and *vice versâ*. There are many places in England where a strict adherence to the 600-feet line gives an absurd impression of the real character of the country in a map of coloured contours.

Thirdly (and here contours and hachuring are equally likely to mislead unless they are corrected intelligently), some correction must be used to show the character of mountain valleys or even of plains. Two examples will explain what I mean better than any generalizations. (1) The Brenner is perhaps the most important pass in Europe. But it is simply undiscoverable on the best wall-

maps. They wholly fail to indicate that, for physical reasons, this particular pass was for centuries the front door of Italy. I find it almost impossible to persuade my pupils, when I confront them with a wall-map, of the real character either of this pass or of the Alps generally. In one of my own maps I have shown the Brenner by a streak of light brown which (measured mathematically) is 10–12 miles wide. That is "grossly unscientific." But it is quite as accurate a representation of cartographical relief as anything in the much larger-scale wall-maps, or indeed in the ordinary small atlases on scales similar to those which I use.

This illustration will show the difficulty which arises with respect to passes. Now (2) for plains. I remember a quite good map of Greece in which the alluvial plains, on which the existence of many towns depended, were shown green, whether they were 100 or 1000 feet above the sea. I do not recommend this method of colouring, because green is conventionally associated with lowlands. But it seems that we need some notation for plains, just as much as we actually have a notation for mountains. Mountains can be shown by hachuring, and on large-scale maps which are covered by a good deal of mountain hachuring, it is possible to indicate the plains among the mountains by dead white. On smaller maps that is not possible. Many hachures on a small map make it unreadable. But by a combination of hachuring and colouring, and perhaps of other symbols, the plain might be allowed its place in the sun. Even in England such expanses as have resulted from the prehistoric lakes of Didcot or Pickering deserve to be distinguished. On a large-scale map, say ½ inch to the mile, with coloured contours and perhaps some hachuring, this can be done easily. On a smaller map, such as I have before me, with a scale of about 1 : 600,000, comparatively few colours and no hachures, these expanses can hardly be credited when pointed out; no one would guess them of themselves. I should be glad if some one would devise a method, perhaps of stippling colours, perhaps of hachuring the limits of these plains, which would make them more visible. Human history depends very largely on plains and passes, and any system of indicating relief in cartography which ignores them, even if it emphasizes perhaps peaks and glaciers, is very unscientific.

Mr. JOHN BOLTON sends the following statement:—

I listened with much pleasure to the excellent paper by Captain Lyons on "Relief in Cartography," and was very glad to learn from the discussion that it is now generally agreed by experts, that the application of colour to this purpose has gone a little too far. I might venture to say that a warning against much colour is afforded by a sheet of the 1 : 1,000,000 map of 'India and Adjacent Countries' that has quite recently been issued. Prof. Davis's suggestion appeared to me to be a most excellent one; if additional contours could be sketched in between the surveyed levels while the surveyor was still on the ground, the addition of hachures on a systematic basis, added afterwards, would give a very accurate picture of the inequalities of surface and gradient, and this without the necessity of guessing at light and shade or imagining rays of light coming from any corner of the map to cast supposed shadows. Let the horizontal interval between the contours be divided into squares, as nearly as may be, the measure of the sides of the square to be equal to the horizontal interval between the contours; draw a number of hachures within each square, always the same number and always of the same strength of line. The lines will, of course, mechanically expand, or contract with the increase or decrease of the angle of slope, and the result must be that undulations of the ground will be represented on the map accurately; almost mathematically accurate.

The only published example of this method known to me is the Plan of Jerusalem in Smith's 'Atlas of Ancient Geography.' This was the first map done by

this method, by draughtsman and engraver, and it may therefore be looked at in the light of an experiment; it will, I think, be admitted that the varied surfaces are represented wonderfully well. This sample was drawn on the surveyed contour-lines as engraved on the Ordnance Survey plan of Jerusalem; but the intercalation of lines, as suggested by Prof. Davis, would add very much to the beauty and accuracy of the picture. This system is scarcely applicable to maps on a smaller scale than 1: 250,000; for smaller scales and for wall maps and school maps we are reduced, as Prof. Herbertson says, to the representation of masses, the broad or diagrammatic features, and these are best represented by contours and flat tints, the so-called layer system.

A DESCRIPTION OF THE GIRARA DISTRICT, WESTERN PAPUA.*

By W. N. BEAVER, F.R.G.S., F.R.A.I.

THE western part of Papua (British New Guinea) has commonly been supposed still to conceal many remarkable features; it certainly contains the last remaining unknown and unexplored areas, though these are rapidly being dealt with. One of these little-known areas is that now to be described as the Girara district, because it is inhabited by people of common kinship, and speaking a common language known as Girara. The district lies between the eastern bank of the Fly river and the head-waters of the Bamu river. I was not the first person to come in contact with the people, but I am not aware that they or the district have been described elsewhere than in official reports. My own knowledge of the district covers a period of some four years.

The banks of the Fly river for over 200 miles are low-lying and swampy; but on the eastern bank about 60 miles from the mouth of the river there is a tract with a more or less elevated shore. At one point called Gaima, where there is a village which is practically the first outlet of the Girara people to the Fly river, the bank is several feet above high-water mark, and is formed of a hard red clay, in striking contrast to the nipa-palm swamp which elsewhere borders the river. Just below Gaima—where the Fly is over 2 miles across from the shore to the nearest islands (Dugope)—a reef, of hard sand and small shells and of mud much impregnated with iron, juts right across the river. This is the only reef, as far as I know, in the lower reaches of the Fly river, with the exception of a small one about 14 miles lower down on the western shore opposite a village called Nabodai. The red clay banks extend—with breaks—from a point about 8 miles below Gaima to nearly double that distance above. The whole formation is curious and interesting. Gaima is situated on a high, rather fertile point, and the whole position is distinctly attractive.

The district was discovered in 1900, I think, by C. G. Murray, then Resident Magistrate of the Division. The natives of western Papua

* Map, p. 480.

have always been found to be more or less reticent as to new tribes; and it was only after much trouble that Mr. Murray was able to get guides, or indeed any information, when he was about to enter this new district. Finally, through the good offices of the Domori people who live on Domori island, and, as was later discovered, are intimately acquainted with the Girara people, Mr. Murray was able to penetrate some distance into the district and to establish a lasting friendship with its people. The district was afterwards occasionally visited by Mr. Murray's successor, Mr. A. H. Jiear, and again by myself.

The track followed from Gaima village led practically almost entirely in a due northerly direction from the Fly river. The land immediately bordering the bank of the river is good, and is favourable for the cultivation of coconuts and, especially, yams. The good land, however, is not of great extent; and the country through which the track leads inland becomes poorer, the timber lighter and more sparse, and the grasses of a thinner variety and poorer quality. The soil is waterlogged in the wet season—that is to say, for nearly nine months of the year. About 5 miles from Gaima there is a huge swamp about one mile by two. It is covered by a broad-bladed long swamp grass. Such timber as is on it and in the vicinity is very stunted, and consists of a small variety of she-oak and small stringy bark (*Eucalypt. robusta*). In the wet season this swamp is almost impassable for foot traffic, but may be crossed by canoe. In the dry season, the traveller may sink almost to the waist in a mixture of rotten swamp grass and mud. The swamp is said to contain numbers of crocodiles, but I am informed, though I am somewhat sceptical about this, that they are not of a kind harmful to man. The women of the neighbourhood do a good deal of fishing in the swamp, which is really only one of a chain which extends for a long distance parallel to the Fly river.

For some distance onward the country is flat, consisting of wide plains covered with a short sour grass, and only broken here and there by narrow belts of timber and sago swamps. The timber is of no great size, and comprises mostly bloodwood (*Eucalypt. corymbosa*), red stringy bark (*Eucalypt. robusta*), and paper bark Ti-tree (*Melaleuca leucadendron*). The first village reached is called Kubu or Mida, and is prettily situated in a large grove of coconut trees. The soil over this area is generally poor, but the particular spots selected by the natives for their villages and gardens are of excellent quality. From Kubu onward the country rises somewhat, and begins to be broken by low hillocks or ridges, the general trend of which is north-east and south-west. Baia, the next village reached, is built among light forest on very low hills. These hills or ridges, I believe, form the watershed between the creeks running into the Fly river and those running into the tributaries of the Bamu to the north.

After leaving Baia the track descends somewhat and crosses a small creek called Kabiri. The natives first called this the Bamu, and led me

to suppose—and apparently both Murray and Jiear were originally misled in the same manner—that this was the head of that river. This seemed an utter impossibility, and it was only after a good deal of questioning that I was able to place it to my satisfaction. The Kabiri, here merely a trickle, flows or rather meanders in a north-easterly direction into a large river variously known as the Aramia, or, more correctly I believe, the Apera-oromo. The Girara natives themselves call the Aramia the Bamu; but this name is very misleading. The Aramia, to refer to it by the name by which most Europeans know it, flows into the main Bamu just above the junction of the Bebea and Dibiri at the top of Sagamu island.

After leaving the ridges by Baia, the country becomes open again and after a succession of very low ridges opens out into one vast swamp. The first time that I crossed this swamp, it was all under water, the Kabiri flowing through its midst and in places was 10 feet deep. At the time of my second crossing, which was in the middle of an exceedingly dry season, I found the swamp dry and Kabiri creek itself almost in the same state.

The country was distinctly more interesting when under water, that is to say, from a picturesque point of view. The natives I had with me described it as the "sea with islands in it." As far as the eye could reach, it appeared to be nothing but swamp dotted here and there with hillocks and ridges. I might mention that these hills, some of which were 60 or 70 feet above high-water mark, proved to be very fertile and were thickly planted with coconuts and other plants of native gardens. The village sites had invariably been selected on the tops of the ridges.

On the northerly side of this depression are two large villages, Warigi and Barimo. Warigi has always existed on its present site, but Barimo, when I first visited it over four years ago, was built to the left of Warigi, and at that time the people were preparing the new communal house in its present position, known as Kakemadas. Barimo seems to be the central village of the district, and the Kabiri river flows past it to the north-east. On one trip I travelled from Barimo to Baia by canoe down this stream. Walking was impossible, the whole country being under water. To the westward of Barimo there is a series of four large villages, all built on the high ground above the swamp-level. Dadi seems to be the extreme western limit to which the Girara people have settled. To the north and east, there is still another series of villages all situated on the creeks and tributaries of the Aramia river; I have a sketch made on my last visit to the district by the chief of Barimo describing the position of these villages, and I have attached a copy to this paper. It is, of course, not geographically correct, but seems to fit in with other information I have been able to collect.

The important river system of the Aramia seems to require thorough exploration. In 1911 Messrs. Butcher and Landtmann made a hurried journey from Gaima to Barimo, there embarked in a canoe, and after two days and nights' paddling, reached the main Bamu river; but

unfortunately the trip was so hurried that no notes were taken and no traverse of the Aramia made. Consequently nothing was achieved beyond proving what was already known, that is, that the Kabiri is a tributary of the Aramia, which again is a tributary of the Bamu river.

In visiting one or two of the villages to the north-east, Adario and Kimamo, both now abandoned, Jiear states he reached the main Bamu river which was there very small. Now at the junction of the Aworra and the Wawoi the Bamu is a very large river, and neither of these tributaries at any point shown on existing maps is as small as Jiear describes. Taking all the evidence I have been able to gather on the subject—unfortunately, Mr. Jiear made no sketch-map of his trip—both from the natives and from my own observations, I have come to the conclusion that Jiear crossed the Aramia and its tributary Kini creek, confusing it with the Bamu owing to the habit of the natives calling the Aramia by that name. Roughly, I think the course of the Aramia must be as follows: starting from its mouth at the top of Sagamu island, it runs westerly and then north-westerly and then probably westerly again. It is a question that it is highly desirable to solve.

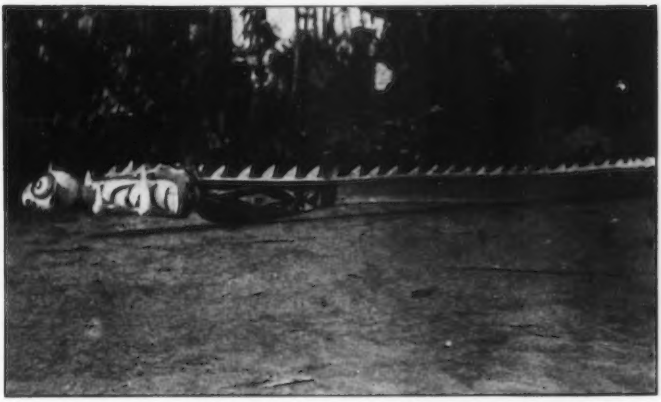
It is said that Kabiri creek is navigable by whaleboat right up to Barimo and that the influence of the tide is felt there, though very slightly. As is well known, a very heavy bore travels up the Bamu at new and full moon, and this bore also goes very strongly up the Aramia; I have no doubt that it also makes itself felt in its tributaries. No attempt has yet been made to reach the Girara country from the Bamu side, but it should prove much easier of access than has generally been supposed.

Last year I made a fresh expedition into a previously unknown portion of the Girara district, starting this time not from Gaima, but a few miles lower down the Fly, from Taitiarato. The country was exactly of the same kind as that traversed on previous occasions. It was all low-lying, swampy, and broken by low ridges and hillocks on which the villages are built. I should say, however, the ridges were, if anything, much lower than those reached by the Gaima route; this is understandable, as of course they are nearer the sea-coast.

Some of the villages had been known by name before, but none of them had been visited and several new ones were discovered. The inhabitants were the same in every respect as those on the Gaima route; but, owing to the intervening dense sago swamps, these two sets of natives do not frequently communicate. Communication, however, is kept up with Warigi, Barimo, and one or two other villages by water, that is to say, by way of the Aramia river and its tributaries, on which both groups of villages are situated.

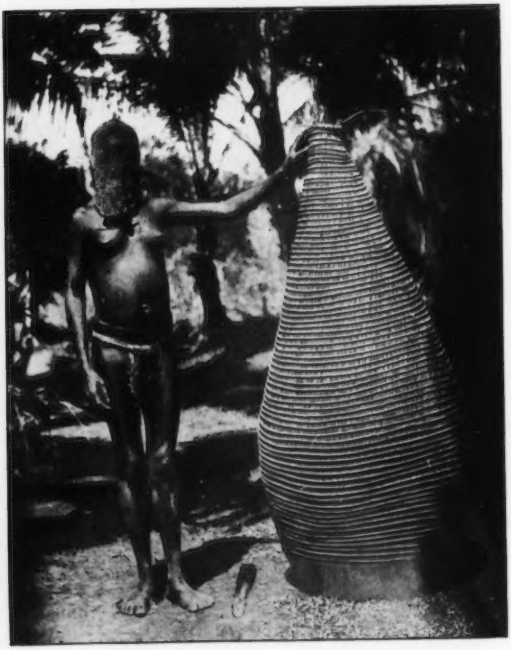
The accompanying sketch-map was made with watch and compass only, and is probably not strictly accurate, but will serve for practical purposes, and as an explanation of the district. The supposed course of the Aramia is shown and the supposed position of its population is shown

TYPES OF GIRARA MEN AND WOMEN.



PROW OF CARVED GIRARA CEREMONIAL CANOE.

GIRARA MAN IN DANCING COSTUME.



TYPE OF VEILED GIRARA WOMAN WITH FISHING POT.

on the native sketch. In addition to the villages in the main Girara district, to the west of Gaima there exists one tribe who must also be included, the Akari. This section possesses a large settlement about the same distance inland as Baia and also a coastal settlement, used more particularly for the purpose of fishing.

The following is, I think, a fairly complete list of villages of a people speaking one language and with the same manners and customs: Gaima, Kubu, Baia, Warigi, Barimo, Adiba, Dogona, Iu, Dadi, Akari, Kotari, Pisi, Isoga, Adario, Burida, Wiwi, Dubosa, Uradu, Sepesepe, Kaniwa, Kabani, Tugaro, Oriomo, Bege. The total estimated population would be between 6000 and 7000. Closely—I am not sure how closely—akin to the Girara people are the tribes of Domori and Pagona, situated on the bank of the Fly river. Legend undoubtedly gives all three the same ancestors, but it is noteworthy that the dialects of the Domori and the Girara differ.

I am not prepared to offer any theories as to the racial origin of the Girara people; but it is certain that their language is Papuan, not Melanesian nor Papuo-Melanesian. The people themselves say that, not far from Gaima, a man married a dog and had as offspring, three sons, the two elder of whom settled at Domori and Pagona, and were the ancestors of the people of those places, whereas the youngest, having quarrelled with his elder brothers, went inland where he saw that the country was good, and decided to make a village. In spite of their dog ancestry, this animal, as far as I am aware, is not the totem of any of them, their totems being five in number: the pig (Itira), the pigeon (Boboa—I think this is the Goura pigeon), the alligator (Dupa), the cassowary (Goragora), and the snake (Amura). The totems were first given out to the people by a hero-ancestor called Ibari. The totem customs do not differ materially from those of other western tribes, and are patrilinear.

The alligator and the pig seem to figure largely in the tribal life of their people, well-carved representations of the former appearing on the canoe prows and of the latter on the house steps.

The Girara people are of medium sturdy stature, and seem tolerably healthy, although skin disease (*tinea imbricata*), yaws, and a good deal of elephantiasis occur. Most of the men wear a conical fibre hat decorated with feathers and painted with red ochre and a white paint made of lime; others wear skull caps of network. The hair is shaved back, showing a high narrow forehead, and a small corkscrew goatee beard is worn (ene). The women cover the head, face, and bosom with a veil of net, which is stated to be a mourning dress. The other dress is scanty and consists of a long tail of coloured grass woven on to a plaited cane belt, drawn tightly between the legs and tucked in the belt again behind. Neither sex tattoo, but cicatrices are in some instances raised. This practice is almost universal in the west, and especially in the Fly and Bamu river districts.

The chiefs have a little authority. The late chief of Barimo, combining the dual functions of chief and sorcerer, was, as far as I saw, the one man in the west implicitly obeyed by his people. A chief is succeeded by his brother, not his son, and the son succeeds after the death of his uncle. Polygamy is the rule, the number of wives occasionally being 14 or 15. Divorce is uncommon.

Each village usually consists of a single large communal house, although in places I have seen women's houses as well. The central part of the house, which is from 15 to 20 feet wide or more, is allotted solely to the men, as are also the doors at each end. The only occasion on which women use these doors is during the ceremony attending the dedication of a new house. At each side of the central space are tiers of cubicles, two deep and two or three high. These are approached by ladders, and are used by the women and children, having entrances from the side. The dimensions of Dogona house are 500′ × 117′ × 70′. Surrounding the house is a large courtyard, through which wide roads planted with crotons, dracaenas and other bright shrubs, lead up to the house in the centre. Close alongside the walls are planted betel nut palms (Areca); then comes the open square, and beyond that again a dense row of coconuts. The open spaces are always kept scrupulously clean, and are very pleasing to the eye.

Sago and fish are roasted in sago leaves or in canes, and, with coconuts, form the staple diet. There are huge fields of sago and coconuts wherever it is possible to plant. Other vegetables used as food are taro and yams. Potatoes and bananas are not largely cultivated, chiefly because the area of suitable land is not very great. They are planted in beds and protected from the sun with shade sheds. Sprouting coconuts are protected in the same way, and the intelligence of these people in their methods of agriculture is indeed of a high order. They are head hunters, but not cannibals.

Betel nut mixed with lime is chewed day and night with something almost approaching ceremonial. The lime is obtained from the coast, to which trading expeditions are made to buy shells for the purpose of burning. No man seems fully dressed without his bag of chewing gear.

The general bent of the people is decidedly artistic, perhaps almost more artistic than that of any other people I have met with in New Guinea; but I am inclined to think that their art is associated in some degree with a phallic order.

The district is rich in bird and animal life. As might be expected in a region which is three parts swamp, there is a great variety of waterfowl. There are two species of ibis, and a species each of crane, duck, and shag. I found three pigeon, the Goura, the Torres Straits, and a large blue variety which is very good eating. Birds of Paradise (*Raggiana*) abound, and there are flocks of cockatoos, parrots, and parrakeets. Of game birds I saw snipe and plover, and on the grass plains considerable numbers of quail of two kinds. In the bush there is abundance of black cassowary.

The commonest animals are the wild pig, yellow cuscus, and small flying phalanger. The two latter are often kept as pets.

As pointed out previously, the timber generally is poor; but I noticed particularly one very long straight tree from which the native torches are made. It has a peculiar aroma, and burns with a bright clear light. I take it to be a kind of tallow-wood.

For the greater part of the year the usual mode of travelling across country is by canoe. The work put into these canoes is very fine. They are long and very narrow in the beam in order to allow of progress through the swamps. The paddles, which are long and lance-shaped with a rib on each side of the blade, are artistically decorated with colours which resist the water—the pigments are, I think, red and yellow ochres.

The fish in the swamps is of poor quality and small. The women are very expert at fishing. They use either a net on a cane frame, something like a butterfly net, or else a large trap made of black cane, looking very like a lobster-pot. These traps are from 5 to 7 feet high.

Among other products very fine tobacco is grown by the natives and put up in rolls. This is traded principally with Domori on the Fly river.

The principal weapon is the bow, which is made of black palm. The arrows are of the usual western type, and are not particularly striking. Three varieties of stone club have been seen, the star, the disc, and the pineapple; but stone clubs are rare in a region where one may travel for many miles without seeing a stone. A wooden club, usually of the pineapple type and made of a very hard brown wood, is in more general use.

The drums are of decidedly original type, and on certain ceremonial occasions a drum some 7 feet in length is used. This is held by one man and beaten by a second with a wooden mallet. The head of the drum is of wallaby skin.

Finally, so little is known both of the Girara district and its people that further exploration would certainly be richly repaid.

DR. MAWSON'S RETURN.

Dr. Mawson's enforced detention, with six companions, on the inhospitable shores of the Antarctic continent, has happily reached an end, he and his party having been brought back in safety to civilization by the *Aurora*, Captain J. K. Davis, towards the end of February. The *Aurora* reached Port Adelaide, South Australia, in the late afternoon of February 26, and Dr. Mawson at once sent to the *Times* a telegram summarizing the scientific results of his expedition, and in particular giving a vivid description of the disastrous journey on which his two companions, Lieut. Ninnis and Dr. Merz, unhappily lost their lives, while the leader himself struggled

back to safety in the last stages of exhaustion. It is now for the first time possible to follow the details of this adventurous journey.

The general results of the expedition have already been recorded in the *Journal* (vol. **41**, pp. 228, 355 ; **42**, p. 82), and need not be recapitulated here. It is sufficient to note, that from all points of view the expedition appears to have been one of the most fruitful of scientific results of all that have been at work in the Antarctic during the past dozen years. As regards the disastrous sledge-journey from the main base with Lieut. Ninnis and Dr. Merz, Dr. Mawson says that his object in undertaking it was to dash as far east as possible so as to ascertain the nature of the land in that direction. The three men had the assistance of sixteen dogs in dragging a load of over 1700 lbs. On December 14, 1912, the party were in 68° 53′ S., 151° 35′ E., having covered a distance of 311 miles. The track had lain over plateau heights and crevassed glacial depressions, the totals of the ascents and descents having each reached 9000 feet. All were in the highest spirits, as prospects seemed good for a further advance over an unbroken plateau at a safe distance from the crevassed coastal downfalls. The day was a beautiful one, and Dr. Merz was leading, on ski, Dr. Mawson following with the first dog-team, while Lieut. Ninnis brought up the rear with the sledge containing the most vital necessaries. Unexpectedly the faint outline of a crevasse crossing the path was noticed, but both Dr. Merz and Dr. Mawson crossed without halting or regarding it as a cause for anxiety. The latter called back "Crevasse" to Lieut. Ninnis, but on looking back soon after saw nothing but a blank expanse of snow and ice. Hastening back, the two travellers found a yawning abyss, and at length discerned an injured dog caught on a ledge, but no trace of their comrade, who must have gone down to the invisible depths below—certainly to instant death. After calling for hours without answer, they read the Burial Service and started on their return, with only one and a half weeks' food for themselves and none for the six emaciated dogs. There was saved also a spare tent-cover, for which a frame was improvised out of a pair of ski and a theodolite's legs. The food was strictly apportioned to the distance to be covered, but bad weather was encountered and the dogs gave out daily, until soon none were left. No nutriment was to be extracted from their flesh, and by January 3 both travellers were very weak, Merz being in the worse case of the two, though still cheerful. Unable to proceed on foot, his companion dragged him painfully in the sledge, but about midnight of January 8–9 he passed away. A month of terrible privation for the survivor followed, with miraculous escapes from falls into crevasses, but Dr. Mawson unexpectedly came upon a cache containing food, left by a search party, and eventually reached the hut.

From a statement by Dr. Maclean, the bacteriologist of the party, it appears that the above-mentioned cache had been laid by himself, Madigan, and Correl, and that when leaving a message directing the leader to another

depôt nearer the base, Dr. Mawson was only 5 miles off, on his weary struggle through the snow. The food found at the second cache gave him strength to reach the first, despite the fearful blizzard, and he stayed there seven days, pushing on to the hut on the eighth. Dr. Maclean also describes a journey over the ice of 270 miles from the main base to a great rock promontory, projecting 7 miles from the coast and rising, glaciated and white, to a height of 1300 feet. It has basaltic columns 800 feet high and a beacon of sandstone formation. A few seams of lignite were found, but nothing living but lichen and mosses. Six specimens of the exceedingly rare Ross seal were secured.

THE HINDIE (EUPHRATES) BARRAGE.

Now that the great Hindie barrage in Mesopotamia has been definitely opened, it is as well to recapitulate some of the principal geographical features connected with the project.

The floods of the Euphrates have always been a cause of trouble; some forty-five years ago the surplus waters found their way by what is known as the Saklawie channel towards Baghdad, where they combined with the waters of the Tigris in causing much damage round that city. This was stopped by Midhat Pasha, then Vali of Baghdad, by closing the Saklawie channel, but his action, and other natural causes such as the silting of the river-bed, had the result of diverting the floods in a new direction, and causing even more extensive damage along the Euphrates farther south. Hitherto the main course of the Euphrates was the stream which ran by Hilla and Diwanie, watering extensive date gardens and numerous villages on its banks. But now the river divided into two branches a short way below Museyib, and these became known as the Hilla or eastern branch, and the Hindie or western branch. Most of the water went down the Hindie channel, creating useless flooded areas, such as the Bahr Shinafie, the Bahr Abu Nejm, and swamps west of Hindie itself, the size and depth of which varied with the season, but which were of little value except to produce rank grass when partly dry, but practically no date gardens.

The Hilla channel or main course of the stream, with its valuable fringe of date gardens, became silted up and dry, except in the flood season.* This was a serious loss to the Government, and some twenty-eight years ago they took steps to build a barrage across the head of the Hindie, with a view of forcing the water back into the Hilla channel.

The barrage was of stone and built out from either bank, leaving a

* See *Geographical Journal*, vol. 28, 1906, "Recent Changes on the Lower Course of the Lower Euphrates," by H. C. Cadcux. This paper gives an account of the deplorable condition of the Hilla channel at that time.

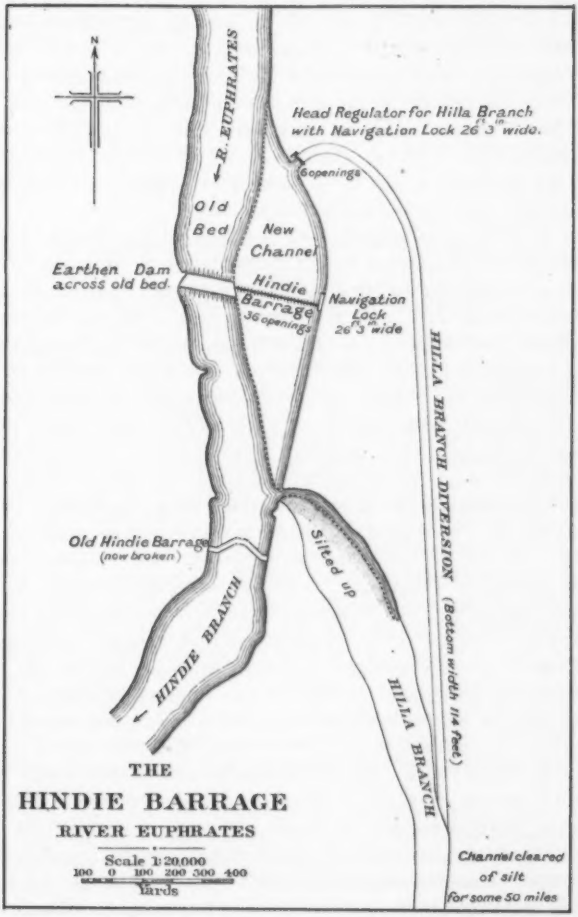
gap in the centre to be eventually closed. But the strength of the current was too great, and the gap remained incomplete until 1909, when Sir William Willcocks was asked by the Turkish Government to complete the opening in the centre of the barrage. This was eventually done, but the foundations in this alluvial soil were found too insecure, and were undermined by the stream, which finally forced its way again through a

gap in the centre, and this still remains open, this barrage having practically become derelict.

Sir William Willcocks then suggested that a completely new barrage should be built about half a mile above the old one, but on dry ground, to ensure the foundations being secure, and when erected, a diversion would lead the river to it, while the old channel would be closed by a permanent earthbank (see plan).

This is the great work that has now been completed by the English firm of Sir John Jackson, in the remarkable time of two years and ten

months, considering the wars and various troubles through which Turkey has recently passed. The mouth of the Hilla channel having partially silted up, it was necessary to establish connection with this branch, and to cut a short canal from a point above the new barrage, at the mouth of which is placed a regulator similar but smaller to the main work.



In one important provision the new Hindie barrage differs from other attempts, ancient and modern, to regulate the Mesopotamian rivers, in that it is not a solid obstruction across the current as all former works have been, but modern science having introduced the use of steel gates and sluices, the barrage becomes more a regulator of the flow than a mere

passive obstruction. There are, for instance, in the main barrage, thirty-six openings, 16 feet 5 inches wide between the masonry piers, each containing a sluice gate which can be operated at will. There is a lock on the east side for the passage of vessels. The head regulator of the Hilla channel is very similar to the main barrage, but has only 6 openings each 9 feet 10 inches wide, and also a navigation lock. Thus with these two barrages or regulators it is possible to arrange at will the supply of water into either the Hindie or Hilla channels.

Actually the water entered the Hilla channel and arrived at Hilla town about thirty-eight hours after the opening ceremony, and there is now 5 feet of water in this long-neglected Hilla channel, the same level being maintained down to Diwanie. At its present level the water enters the regulator of the Hilla channel at a depth of 4 feet, but this will gradually increase as the floods come down.

It is interesting to remark that the level of the Hindie branch has not been materially affected by the re-opening of the Hilla channel. This may be accounted for by the fact that the waters in the Hindie are held up by the Shenafie lake. It may be noted that levels vary very slightly; as Baghdad itself is only 115 feet above the level of the Persian gulf, the Hindie barrage is 102 feet and the Bahr Abu Nejm 63 feet.* It seems now certain that the towns and date gardens along the Hilla branch will again receive their proper supply of water all the year round. But there are other problems which might now usefully be taken in hand: first the restoration of the large subsidiary canals which used to flow eastward from the Hilla branch, the principal of these being the Shatt-en-Nil, which reached to the Tigris near Kut-el-Amara, irrigated a great extent of country, and was also a canal navigable by boats carrying freight as well as serving for irrigation. From the very earliest times, even those of Khammurabi and the Sumerians, who were pre-Assyrian, the larger canals were used not only for irrigation but also as waterways, and this great canal was used for these purposes as late as the time of the Abbaside Caliphs, as shown by the ruins of the city of Niliye† of that period, when the abandoned bed of the canal testifies to its having had an average width of 100 yards. With the advent of motor-boats and barges on the restored navigable canals, they would be most useful for transporting the produce of the country either to a central railway or down to the port of Busra. The canals of the Shatt Dighara and the Shatt-el-Khar, farther south, which watered the districts east of Diwanie, is another important work which might well be restored. It would seem that there is still much water entering the Hindie channel and becoming lost in the swamps, but by the use of the new regulator

* See map with levels in *Geographical Journal*, vol. **40**, p. 588.

† See Saare and Herzfeld's 'Archæologische Reise in Euphrat und Tigris Gebiet,' which gives a recent study of this canal and the ruined cities along it, with special reference to Niliye.

this should be altered and the swampy areas about Hindie town brought into profitable cultivation.

But there is still the question of dealing with the great spring floods of the Euphrates, and another part of Sir William Willcocks' scheme is being taken in hand to deal with this. During the levelling operations of his survey the existence of the Habbania lake and depression were discovered, and they form an ideal natural reservoir into which to lead the surplus flood waters. This was an important geographical discovery, apparently accidental, and by constructing a regulator, known as the Habbania Escape Regulator, at a point where rocky foundations are known to exist near Ramadie, and then by digging a short canal to lead to the lake, it will be possible to regulate the flood waters and divert them into this natural basin that awaits them.

THE GEOGRAPHICAL ASSOCIATION.

THE annual meeting of this association was held on January 3, 1914, at the University of London, under the presidency of Dr. J. Scott Keltie.

The Annual Report of the Geographical Association shows that its membership and its work are both steadily growing. There are now 1076 members, and branches have been opened in eight different centres. Each branch has a programme of lectures, discussions and excursions, and some branches have attempted to make local geographical studies. During the year the Council of the Association have recommended that great caution should be exercised in the use of the kinematograph in geographical education; they have discussed the possibility of teaching geography and history as a combined subject; they have appointed committees to examine into the current syllabuses and examination papers in geography; while the *Geographical Teacher*, the organ of the Association, has been enlarged, and considerable additions have been made to the lending library, of which members are taking greater advantage.

It was very appropriate that Dr. Keltie should be elected President of the Association in the year in which it comes of age. Both Mr. Mackinder and Dr. Herbertson pointed out how much Dr. Keltie had done, not merely to start the movement for improving geographical education, but to help it at every stage. Dr. Keltie's address was on "Thirty Years' Progress in Geographical Education." The following is a summary:—

Your selection of me as President for the year 1914 is suggestive. It is just thirty years since the Royal Geographical Society began that crusade on behalf of the improvement and elevation of geography, and a better recognition of the subject in education of all grades, which has had some noteworthy results, including the foundation of the Geographical Association, which was started in 1893, so that it may be said to have reached its majority. Mr. Douglas Freshfield became President of the Association in 1897, when there was a membership of 73, and when he retired from the Presidency in 1911 the membership had reached 908, and now it is over 1000, with eight branches in various parts of the country.

Universities.—I happened to be the "fly on the wheel" of the movement initiated by the Royal Geographical Society, and it has been suggested that I

might appropriately refer to what has been achieved during these thirty years. In 1884 I was fortunate enough to be appointed Inspector of Geographical Education to scour our own country, and the chief countries on the Continent, in order to obtain information as to the position of geography in education institutions of various grades. The results were published in a report to the Council, in which certain recommendations were made, especially as to the position of geography in the two great Universities. Oxford was tackled first. I need hardly remind you how much we owe to Mr. Mackinder for the strenuous and successful efforts he made to secure for the subject a worthy place among the University studies. Not only in the University, but elsewhere, by lecturing and writing, and in other ways, he drew wide attention to the subject, and helped greatly to break down the prejudice which existed against geography, as unworthy of serious attention. When Mr. Mackinder left Oxford to take charge of the London School of Economics, he left the Oxford School in a healthy and prosperous condition, and soon organized an equally prosperous Geographical Department which, in combination with that at University College, under Professors Garwood and Lyde, can now give a complete geographical training. Under Dr. Herbertson, Oxford has continued to prosper, and the staff and collections and work have greatly increased, the subject being more and more distinctly recognized as a regular branch of University education qualifying for the Pass B.A. degree and for research degrees. It was a year after Mr. Mackinder was appointed Reader at Oxford when Dr. H. H. Guillemard was appointed Lecturer in Geography at Cambridge. Unfortunately, ill health prevented him entering on his duties, and Dr. J. Y. Buchanan succeeded him. He also retired after a year or two, when Mr. Yule Oldham, who had been doing good work in initiating the subject at Victoria University, Manchester, was appointed Reader at Cambridge. Notwithstanding various difficulties, geography has been established on a firm footing at Cambridge, all departments being well catered for, and the subject recognized in the examination for the Pass B.A. degree. The example of Oxford, Cambridge and London became infective, and has been followed in several important centres—Manchester, Liverpool, Birmingham, Reading, Leeds, Sheffield, Aberystwyth, Edinburgh, Glasgow, within the past year Newcastle, Nottingham and Southampton, and indirectly elsewhere.

A Report on Geography in British Universities in the autumn number of the *Geographical Teacher*, affords striking evidence of what has been accomplished up to now in all the institutions of University rank in which the subject is represented, even on a modest scale; the same comprehensive programme is aimed at, embracing the fundamental bases of the subject and its many applications. We have such heads as the Principles of Geography; Survey of the Natural Regions of the Globe; Land Forms and the Morphology of the Continents; Meteorology, Climatology and Oceanography; Human Geography in its various phases; Geographical Methods and Notations, and so on.

Educational cartography has taken a great step forward. Any one going through the whole survey courses available at least at Oxford and Cambridge might, with a little practical experience, be quite equal to a post on a boundary commission. But this is not the only outdoor work, for geography has to deal with a concrete earth. It has surface features of all kinds to investigate, and the life that is lived amid these features, and to a considerable extent conditioned by them. It is the duty of geography to investigate these conditions on the spot, and to work out the problems suggested by them. This is now well recognized, and at Oxford and elsewhere what is known as regional geography is dealt with on a practical basis. This department of geographical work is still in its infancy;

a mere collection of local facts and statistics is not enough; correlations ought to be investigated and deductions as precise as possible made as to the results of the interaction of the various factors. The study by Dr. Mill of a Fragment of the Geography of England (south-west Sussex), published in vols. 15 and 16 of *The Geographical Journal*, might be taken as a model of what is required in regional geography.

The recognition of the importance of geography by the Civil Service Commissioners, who give it the rank and the same number of marks as other branches of Natural Science, has had an important influence on the teaching of the subject, especially at Oxford, Cambridge, and London. Unfortunately, this has not yet led the two older Universities to follow the example of London and recognize geography as an Honours subject. Now that there are the teachers, the materials for teaching, and the incentive for teaching it on the standard of an Honours School, surely the time has come to give it the recognition that other scientific subjects have. The precision required of the map-maker, the observation and interpretation needed for the study of geomorphology, the many practical problems of economic and political geography, all demand at least as comprehensive and thorough a training as is given to Honours students in other sciences.

Schools.—A new epoch in the history of geographical education in England began in 1905, when the Board of Education issued its Regulations for the Teaching of Geography in Secondary Schools. Perhaps the most important point in the new regulations was that a definite number of hours a week—"not less than two periods of school work and one of home work"—were to be allotted to geography in Secondary Schools. Provision had to be made for a four-year course of the work, and the course had to include the geography of the whole world, so that the custom of keeping the pupil at work on one or two particular continents, according to the exigencies of examinations, until he left school, was discountenanced. Particular attention was given in the Board's circular to the importance of practical exercises, such as "worked-out problems together with original maps and plans" in geographical instruction. Consequence had to be connected with cause, and reasons had to be stated with facts instead of presenting lists of place-names, rivers, communications, and so on, as catalogues to be learned without being understood.

The teaching of the subject throughout the country now underwent a change on account of the new conditions; from being classed as memory work which could be put into the hands of any teacher, geography became a reasoning subject requiring individual work by the student and sound knowledge by the teacher as much as any other subject taught on scientific principles. Too much attention was perhaps paid at the outset to the working of practical problems and exercises, but this has now righted itself, and the human note is not forgotten while the scientific method of arriving at it is followed. What is more important than anything else is that the standard of work in geography is steadily rising. The subject is being treated more and more on a regional basis, and the work is consequently gaining in intelligence.

By the introduction of practical exercises, both in school and out, geography has been brought in line with other subjects taught by truly educational methods. Geographical material is being used to stimulate intelligent inquiry and as a means of mental discipline, rather than as information to be committed to memory. The methods by which geographical science has been built up are thus illustrated, and a vocabulary is provided by means of which geographical facts may be interpreted. Combined with the collection and consideration of concrete facts, there must, however, be lessons and reading intended to inspire

interest in the Earth and its inhabitants, and to cultivate appreciation of what may be termed the intangible influences and factors of geographical character. When taught in this way, geography may be made one of the most valuable subjects in a school curriculum; for it provides not only the intellectual discipline of a science rightly studied, but also the human interest and sympathy of the most inspiring literature.

The authorities which control the work of schools have also encouraged the new method by issuing circulars and memoranda containing advice and guidance as to the methods and aims of teaching. Since the publication of "Suggestions for Teachers and Others concerned in the Work of Public Elementary Schools" in 1905, containing a chapter which breathed the new spirit of geographical teaching, a number of similar documents have been published, including a detailed Report on the Teaching of Geography in Elementary Schools, published by the London County Council; a Syllabus of Instruction in Geography in Secondary and Elementary Schools, issued by the Royal Geographical Society; and a Memorandum on the Teaching of Geography in Scottish Primary Schools, issued by the Scotch Education Department. All these publications illustrate the essential place which geography must occupy in the school's curriculum, and suggest the principles and methods which should be borne in mind in courses and lessons upon it. It is no longer necessary to advocate the claims of geography to an important place in any educational scheme; that battle has been fought and won, and the future of the subject in schools of all grades rests chiefly with the teachers.

Training Colleges.—In certain institutions facilities are provided for Training College students going through a course of instruction in geography, with opportunities of actual practice in schools. I am not sure that this method is quite satisfactory; it would be well if all Training Colleges were as fully equipped for geographical work as they are in other departments. In no class of school can geography be satisfactorily taught on modern lines unless the teachers are as seriously trained in that as they are in grammar, arithmetic, or any other essential parts of their course. In certain Training Colleges, the subject is in charge of geographical specialists. This ought to be the case in all Training Colleges, as well as in the Universities from which the supply of teachers for secondary and higher schools are drawn. But if the progress is as marked in the next quarter of a century as it has been in the past, there can be little doubt that the existing deficiencies will be removed, and geographical education will be on as satisfactory a footing in England as it is in Germany.

The new regulations which have recently been issued for the position of geography in the Training College curriculum are certainly an advance on those which were in force. Geography is no longer tied to history as it was before, and it is now on an equal footing with certain other subjects, but so far as I can make out it is still optional, and there is no assurance that a student will leave the college with a knowledge of geography sufficiently adequate to enable him to teach it to his pupils on modern lines. I need not examine the new programme in detail, as that is done with great ability and a thorough acquaintance with the conditions by Mr. A. A. Davey, in the autumn number of the *Geographical Teacher*.

Civil Service.—Time prevents my dealing in detail with the position of geography in the Civil Service and other public examinations. It is better than it was, and in some of the lower grades of the Service there is not much to complain of in the examinations. In certain of the higher grade examinations, geography has been introduced as an optional subject, as I have previously mentioned, and

in this respect it is on the same footing as other scientific subjects, with which it is classed. Thus we can hardly complain so long as geography is allotted the same marks as other optional subjects. But surely in some positions it would be of distinct advantage to make it compulsory—for Colonial and Indian Services, for the Army, for the Foreign Office and Consular and Diplomatic appointments, for certain Board of Trade and Local Government Board appointments. But this at present may be a counsel of perfection. Let us work without ceasing, in the hope that in time we shall accomplish this and much more.

Geography as Branch of Knowledge.—But apart from the educational aspect of geography, what is its position in the country as a branch of knowledge? Is it to be regarded as a science? You find some scientific men in England who deny that geography is a science or can ever be a science, because for one thing it is a *graphy* and not a *logy*. It is remarkable if geography is the one thing in the universe that cannot be dealt with on scientific methods, producing a body of knowledge as systematically arranged as that included under Geology, Meteorology, Astronomy, or Engineering, and other sections of the British Association. Personally, it does not irk me whether geography is admitted to be a science or not. It is a department of investigation which deals with a field untouched by any other department—the Earth as the Home of Humanity. Like other departments of inquiry, it can collect its facts and draw its inferences on scientific methods, with results which in many cases could be cited in the geographical output in Germany, and happily in a few instances, in our own country—of the first importance towards the solution of problems intimately associated with human life and activity.

In this country, we are comparatively new to the work, only feeling our way, as it were, only trying to find out exactly what are the conditions under which our line of research will produce the best results, what are the limits within which we must work. It is true that geography is the mother of all the sciences, and though her numerous children have long ago set up for themselves, still she has more or less intimate relations with many of them. All the same, she must not be too grasping; she ought to form a clear idea of what she has a right to, what are the limits of her field of operations. To vary the simile, the geographers in this country have been moving into a much more spacious mansion; we have hardly had time to put our house in order; we may find when we do so that we have not room for all the furniture that some of our friends would like to squeeze into it.

I have broached a subject which might itself occupy more than an hour in dealing with it. I hope I have succeeded in showing that during the last thirty years geography has grown in stature and in strength in this country; that in fact it has reached man's estate, and that both in education and in research it is trying to do a man's work. It has still much to learn which can only come by experience, but it is bound to come if we work in the future as in the past, and that all the more rapidly and successfully in proportion to the increasing number of workers. The Royal Geographical Society has itself extended not only in numbers, but in varied activities during these years. Its staff has been quadrupled to keep pace with its work; the scientific side of the subject receives more and more attention; the *Geographical Journal* is recognized as the leading organ of geography all the world over. The efforts of the parent Society are effectually supported by those younger societies which have grown up in various great centres. It is often stated that the work of Geographical Societies is nearly completed, that they will soon have had their day and cease to be, for the World is being rapidly explored and mapped. There is plenty of work still to do in

exploration and mapping, and when that is complete the real work of Geography and Geographical Societies will only begin. The explorer and map-maker only lay down the foundations of the subject; it will remain for generations of geographers to rear thereon a stately structure fitly representing "the kingdoms of this World, and all the glory of them." One of the most effective mediums through which the subject can be promoted, especially in education, is the Geographical Association, with its thousand members, which has done me the honour of electing me its President, for which honour, in conclusion, I again render you thanks.

Mr. Freshfield proposed a vote of thanks to Dr. Keltie for his address, which was seconded by Mr. Mackinder. Mr. W. H. Arden Wood, C.I.E., Principal of La Martinière College, Calcutta, then read a paper on "Personal Experiences of Indian Geography," in which he described the many changes which have taken place in even recent years in the delta and distributaries of the Ganges; the effects of earthquakes, and the movements and characteristics of cyclones.

The Rev. W. J. Barton, of Winchester College, opened a discussion on what should be in a school atlas: he asked for uniformity of scale, or scales of even multiples, showed how he would divide up Europe and other continents, and advocated hemispherical world maps. Mr. Fairgrieve said that *a* school atlas was insufficient, and that there should be at least *two* school atlases—a more elementary one and a more advanced one. Dr. Unstead desiderated maps for teaching purposes which were printed in an ink which could disappear in three years. Mr. William Stanford (of Messrs. G. W. Bacon & Co.) and Mr. George Philip (of Messrs. G. Philip & Son) pointed out some of the difficulties that a publisher of a school atlas had to face, and Mr. Mackinder spoke strongly against any attempt being made to stereotype atlases, and so teaching. He himself advocated the placing of world maps at the end of an atlas, so that the pupil did not deal with them until he had gained some richness of geographical thought and knowledge about the different parts of the world. A committee would profitably report on such a subject as size of type and treatment which would strain the eyes least, but it would not profitably put books through a sieve with regard to their ideas: the old South Kensington Science and Art Syllabuses were a sufficient warning of that.

Mr. B. C. Wallis, of the Holloway County School, then discussed some difficulties of the teacher of geography, and showed how by pictures and models he tried to make unfamiliar places known to his pupils, and how he applied modelling methods to the construction of solid diagrams to illustrate distribution of density of population, etc.

A full report of the proceedings will be found in the spring number of the *Geographical Teacher*

THE CLASSIFICATION OF LAND FORMS AND LANDSCAPES.

In a lengthy monograph which forms the greater part of Band 26, Heft 2, *Mitt. Geog. Gesell. in Hamburg*, Professor Passarge makes a commendable effort to meet a long-felt want of systematic geographers. The various classifications of land forms adopted in geographical textbooks are usually admitted to be imperfect and more or less artificial, and although the advantages of possessing a natural genetic classification have been repeatedly pointed out, little or no serious attempt has hitherto been made to provide one. Dr. Passarge, therefore,

has done good service to geography in publishing this essay upon *Physiologische Morphologie*, and it is to be hoped that the attention which he has directed to this important and scientific study may stimulate other experienced workers to renewed activity in the same field.

Prof. Passarge remarks that it ought not to be an impossible task for geographers to set up a natural classification of land forms into orders, families, genera, and species, just as botanists and zoologists have succeeded in establishing a natural classification of plants and animals. In the case of geography, however, the task is rendered much more difficult owing to the fact that species and genera are rarely sharply limited. Land forms everywhere pass into each other, because the forces which produce them rarely act singly, but usually in groups of two or more. New forces also may be added to any group at any stage, while older members of a group may disappear or vary much in intensity; and with every modification of the grouping of the forces, a corresponding modification of the surface forms is produced. An intimate scientific analysis of the various forms must therefore be carried out; and, for purposes of classification, all transitional forms must at first be neglected and attention concentrated upon the forms produced by single forces or by definite groups of forces.

Premising, therefore, that such detailed investigation of individual forms has been completed, Prof. Passarge proceeds to set up two great types of surface forms, Land Forms and Coastal Forms, including respectively all the forms produced within the realm of activity of the two greatest force-groups. The type of Land Forms is then subdivided into two classes, Endogenous and Exogenous Land Forms, representing a primary subdivision into two major force-groups. These classes are further subdivided into orders, or smaller force-groups, and the orders into families, or smallest force-groups. The class of Endogenous Land Forms is thus subdivided into two orders, Tectonic Forms and Volcanic Forms, and the class of Exogenous Land Forms also into two orders, Deposition or Accumulation Forms and Excavation or Removal Forms. The order of Tectonic Forms is then subdivided into the families of Flexure, Fracture, and Fold Forms: the order of Volcanic Forms into the families of Intrusive, Eruptive, and Effusive Forms: the order of Accumulation Forms into various families of Accumulation Forms, due respectively to the action of water, ice, wind, temperature changes, vegetation, animals, and the sea: and the order of Removal Forms into the families of water, ice, and wind-removal forms, and forms arising from disintegration through temperature changes and the action of plants and animals. It will be seen that the content of the various form-families corresponds fairly closely with the phenomena resulting from the activity of the various agents of surface deformation as usually enumerated in text-books.

Prof. Passarge, however, proceeds to point out that the various agents of surface deformation are not single forces but force-groups, and therefore capable of further analysis. Form-families are, therefore, subdivided into genera and sub-genera, corresponding with the sphere of activity of single forces, and these genera and sub-genera are then shown to include a number of species or special forms. For example, the family of Fold-Forms is subdivided into the three genera of (1) symmetrical folded mountains; (2) asymmetrical folded mountains; and (3) overthrust folded mountains, of which saddles, troughs, schuppen, etc., are special forms. The family of Water-Accumulation-Forms is subdivided in the same manner into the genera of (1) mechanical accumulation forms with the sub-genera of stream and rain accumulation forms; (2) chemical accumulation forms; and (3) forms arising through surface creep—the special forms of these genera including alluvial flats, deltas, accumulations of rain wash, sinter cones

and terraces, stalagmites and stalactites, earth and rock flows, land-slips, etc. Again, the family of Water-Removal-Forms is subdivided into two genera: (1) solution forms and (2) erosion forms, the latter with the sub-genera of stream-erosion forms and rain-erosion forms; and the various genera and sub-genera include a variety of special forms such as pipes, dolinas, caverns, V-shaped and flat-bottomed valleys, rock platforms, earth pyramids, etc.

It will be observed that a striking feature of this system of classification is the large number of special or individual monodynamic forms which find a place in it and whose complete genetic history can be stated concisely in tabular form. Take, for example, such diverse forms as rift-valleys, ant-heaps, and mushroom-shaped rocks, which are classified thus:—

Special form	Rift-valley.
Genus	Depressed forms.
Family	Fracture forms.
Order	Tectonic forms.
Class	Endogenous forms.
Type	Land forms.
Special form	Ant heaps.
Genus	Accumulations of land animals.
Family	Animal accumulation forms.
Order	Accumulation forms.
Class	Exogenous forms.
Type	Land forms.
Special form	Mushroom-shaped rocks.
Genus	Mechanical erosion forms.
Family	Wind removal forms.
Order	Removal forms.
Class	Exogenous forms.
Type	Land forms.

Some special forms, such as mushroom-shaped rocks, may be produced independently by different forces, but such cases are readily included within the system, *e.g.*—

Special form	Mushroom-shaped rocks.
Genus	Insolation forms.
Family	Physical disintegration forms.
Order	Excavation forms.
Class	Exogenous forms.
Type	Land forms.

There is, however, a number of common land forms which are the product not of single but of two or more forces acting together, such as fractured folded mountains, composite volcanic cones, river dunes, kames, mangrove swamps, etc. These may conveniently be termed *polydynamic* forms and classified according to the predominant force.

These methods of classification applied so successfully to Land Forms are next extended to the author's second type of surface forms, namely, Coastal Forms. These are subdivided into four classes: (1) Coastal Forms dependent upon adjacent Land Forms; (2) Coastal Forms dependent upon the form of the adjacent sea floor; (3) Coastal Forms of new Accumulation-Lands; (4) Abrasion Coasts. Each class is subdivided into orders, families, genera, and special forms as before, with, however, less success than in the case of Land Forms.

Having thus elaborated a classification of surface forms, which introduces into the study of Geomorphology a systematic precision hitherto unknown, Prof. Passarge boldly attacks the further subject of Landscape Geography, which, up to the present, has been largely neglected by geographers. His analytical treatment of the subject forms a valuable study in the course of which he introduces the terms *consonant*, *dissonant*, *harmonic*, and *disharmonic*, with the object of rendering our conceptions with regard to landscapes more precise. Consonant phenomena are those which are anywhere produced by the same concert of forces, which may vary in intensity amongst themselves, as, for example, the various phases of fluviatile erosion. Dissonant phenomena arise when and where a given concert of forces is disturbed by outside influences, as for example where a steppe or desert zone is crossed by a river valley or a desert coast broken by a delta. Harmonic phenomena in landscapes are all those which can be explained as the product of forces now active in the region, while disharmonic phenomena are those which cannot be so explained and which require the postulation of some recent or remote crustal disturbance or climatic change. The classification of landscapes into types, classes, and orders is based upon the classification of land forms previously adopted, and is of quite a tentative character. The author deals mainly with ideal consonant monodynamic landscape forms, while admitting that the great majority of actual landscape forms are polydynamic and frequently dissonant and disharmonic. The monograph closes with two useful chapters on map and landscape analysis.

Prof. Passarge's wide experience of both tropical and temperate countries has especially fitted him for his self-imposed task. Every credit is due to him for his pioneer work in this as in so many other fields, and whether or not his system of classification of land forms and landscapes be ultimately generally accepted, his valuable monograph deserves to be widely and carefully studied. One cannot but think, however, that he would have been well advised to omit many of the references which he makes in a somewhat hypercritical spirit to the writings of Prof. W. M. Davis. Indeed, it is difficult to understand at times why he should indulge in criticism which has little or no relevance to the presentation of his own case. Every teacher, if not every student of geography, knows well both the value and the limitations of Prof. Davis's work, and Prof. Passarge, by his laboured criticism, has achieved nothing but the thankless task of recording common knowledge.

J. D. Falconer.

REVIEWS.

EUROPE.

'Modern Russia.' By Gregor Alexinsky. (London: Fisher Unwin. 1913 (date of translation). Pp. 361. 15*s*.) This book has been translated by Mr. B. Miall, and certain sections are extended in this edition as compared with the French. The work deals almost wholly with Russian political, administrative and social topics and problems, and does this very clearly and systematically. The reader possessing the usual superficial knowledge of Russian conditions will not fail to find all the points in that vast subject which are familiar to him clearly elucidated. The description of the country itself is compressed within the inordinately small compass of four pages. The empire is dealt with simply as a plain, but within this limit a real endeavour is made to establish a connection between physical environment and human conditions.

'The Upper Thames Country and the Severn-Avon Plain.' By N. E. MacMunn. (The Oxford Geographies: Clarendon Press. 1913. Pp. 124. *Maps and Photographs.* 1*s.* 8*d.*) Miss MacMunn's "Study of the central scarpland country of England" is worked out on a regional basis, and is an example of the valuable results which may be obtained from such investigations. The location and character of the villages as centres of human life and industry receive, for example, careful treatment, which aims at demonstrating the ways in which man reacts differently to his environment even in places which are but a few miles apart. The houses of the Cotswold villages lie in deep, narrow valleys and straggle lengthwise by the rivers from which the water is obtained; the houses in the villages of the Oxford Plain cluster round a pond or well; a line of little towns lies along the steep foot of the Cotswolds, Chilterns, and White Horse Downs. In the Cotswold villages there is little greenery, the cottages, as a rule, lack gardens, and where gardens occur they are surrounded by stone walls. These villages are in contrast with the brightness of the villages of the plain with gardens full of flowers and creeper-covered thatched cottages.

'Historical Geography of Scotland.' By W. R. Kermack. (Edinburgh: W. & A. K. Johnston. 1913. Pp. 134. *Maps.* 2*s.* 6*d. net.*) Mr. Kermack's book is, in the main, a geographical history, for it relates historical progress to geographical conditions; *e.g.* in the first chapter, he instances the details of the "centuries of strife," and the "historical accident" which led to the adoption of the present boundary between the two kingdoms. At the same time the main emphasis of the book lies on the period before, let us say, 1881; an outlook which is essentially historical, for the geographical account of the present condition of the country—an account which, after all, is but the history of the present and the immediate past—is but scantily treated. A good chapter is devoted to the influence of the configuration of the Highlands upon the clan system. Some of the maps suffer greatly from the roughness of the paper which is used.

ASIA.

JAPAN.

'Japan's Inheritance: The Country, its People and their Destiny.' By E. Bruce Mitford. London: T. Fisher Unwin. 1913. *Illustrations and Maps.* Pp. 384. 10*s.* 6*d. net.*

Mr. Mitford essays in this book to present the truth about Japan; his task is to describe the country *qua* country, to correct misapprehensions which may be due to the fact that previous descriptions have been the work of "casual" visitors, not of "men who, by long residence and study, are eminently fitted to write about Japan." Interestingly and without the extreme technicality of a text-book, Mr. Mitford describes the country in what may be called the geographical sequence: from geology to climate; from the discussion of ways and means in travel to the description of the landscape, the lakes, the highlands, he reaches the story of the volcanoes, earthquakes and hot springs; he then passes to the life of the people, discusses education, religion, and the political fabric; refers to the colonial empire, the results of the meeting of East and West, and concludes with a peep into the future. Such in skeleton is the nature of the book, which is excellently illustrated by many photographs, although it is a pity the maps are such poor specimens of the art of the cartographer—in some cases they are extremely indistinct. Gently and easily the reader is lured onward, he receives a general impression which is quickly crystallized in a phrase or two: "In this fortress (the go-down) they keep their valuables; in

the doll's house they keep themselves." "No more industrious and thrifty soul exists on this planet than the Japanese peasant. 'All work and no play' is his lot from one year's end to another. Soon after sundown a hush falls over street and house. A 'tub,' a frugal meal, a pipe, and the people are asleep. Which is not surprising, seeing that they rose with the dawn and have toiled in the fields ever since. There is no social life in a Japanese village, because there is no leisure." "Education and religion are, therefore, more closely connected in Japan than, probably, in any other country. More definitely, too, than in any other country are they used as a means to an end. That end is patriotism." "The Japanese believe that they have a mission in the world." No one who wishes to know Japan as a whole can afford to omit this book from his sources of information. B. C. W.

Exploration in Kashmir.

'Thirty Years in Kashmir.' By Arthur Neve, F.R.C.S.E. With illustrations and a map. London: Edward Arnold. 1913. 12*s.* 6*d. net.*

Dr. Arthur Neve, in this book, gives us an account of all his explorations and mountaineering expeditions in Kashmir during the last thirty years.

He has travelled far and wide in that part of the British Empire "where three Empires meet," and all who are interested in Kashmir and the great mountain ranges that lie to the north of it will find in Dr. Neve's book plenty and to spare of information, adventure, and interesting reading. No one knows this part of the world better than Dr. Neve. Since 1886 he has been in charge of the Medical Mission in Srinagar, together with his brother Dr. E. Neve; and it was during such time as could be spared for holidays that most of the journeys described in the book were undertaken.

Some of the country he describes is the most magnificent in the world. The great range of the Karakoram mountains, the unique Indus valley, the lofty Himalayan peak Nanga Parbat, and the twin peaks of Nun Kun, are amongst the most important subjects he deals with. He has explored new country, crossed passes not visited before by Europeans, climbed several times to over 20,000 feet, and at the same time has always been ready to help all the natives he came in contact with by medical advice, and by performing such small operations as were possible under the circumstances. It is not to be wondered at that he and his brother are more widely known and respected by the inhabitants of Kashmir, and of the intricate and out-of-the-way districts that lie to the north of Kashmir, than any one else; they have spent thirty years in helping and giving medical aid to the natives, who without their aid would get none.

The first journey Dr. Neve describes is one to the Nushik pass, a pass over the Karakoram from Shigar to Hunza. This was in 1895. Some years before it had been crossed in the opposite direction by Colonel Bruce and Zurbriggen, who were with Sir Martin Conway. Dr. Neve, however, visited it much too late in the year (September), and as a result found the crevasses on the north side of the pass impracticable. He next visited that outpost of civilization, Chilas on the Indus, that only a few years before had been held by one of those robber tribes that allowed no Europeans into their country. To get there the Himalaya had to be crossed; Dr. Neve chose the Barei pass, and made the first recorded crossing by a European. He visited that astounding valley of the Indus just north of Nanga Parbat. No grander, more desolate, or more colossal rift can exist anywhere on the Earth's surface. On the north side the cliffs rise over 12,000 feet above the Indus river at their base, whilst on the south side the summit of Nanga Parbat is nearly 24,000 feet above the bottom of the

valley. He gives a particularly interesting account of the Hunza campaign (1891), one of those dramatic border wars where three V.C.'s were earned. Next he visited those two great peaks of Nun Kun (23,447 feet) that lie just east of Kashmir. These he re-visited in 1910, and proved conclusively that the great west glacier of the range flowed down to the Bhot Kol. This had been contradicted. Dr. Neve's most important expeditions, from a geographical point of view, were in 1908 and 1909 to the Murgisthang glacier, and in the following year with Dr. Longstaff and Lieut. A. M. Slingsby to the Saltoro and the Bilaphond pass. It was after crossing this pass that they discovered the Siachen glacier, which is by far the largest in Asia or elsewhere outside the Arctic regions. They also discovered a whole range of mountains unknown to the Indian Survey, the highest, Teram Kangri, being about 25,000 feet. In the book Dr. Neve also gives much information about the people, their customs, and their habits. There are chapters on Srinagar in the Eighties, the Medical Missions, the Conquest of Ladak, the Gilgit frontier, etc.; there is also a good deal of information about most of the important political events connected with Kashmir and the borderland north of Kashmir. Dr. Neve has made good use of his unique opportunity for amassing information during thirty years, he has produced an eminently readable book, he has added to our geographical knowledge, and has contributed one more important work to the literature of our Indian Empire.

J. N. C.

AFRICA.

South Africa.

'The South African Scene.' By Violet R. Markham. London: Smith, Elder & Co. 1913. *7s. 6d. net.*

The first part of 'The South African Scene' ranks with the best of the impressionist sketches of the southern portion of Africa. Miss Violet Markham knows the country from Cape Town to the Victoria falls, and she has admirably caught the atmosphere of its vast spaces and great solitudes. Equally well does she enter into the spirit of the older, more settled districts, as her chapter on "The country of the Van der Stels" proves. The result is that her travel sketches leave clear-cut impressions, and if they do not teach geography formally they give the reader a distinct and accurate picture of the general characteristics of the land and of the people who dwell therein. The second part of the volume is called "Some Policies and Problems." In it Miss Markham deals in an able, lucid, and attractive manner with the great political, social, and racial problems which await solution in South Africa. This is not the place in which to enter upon a discussion of those problems, but the author may be thanked for her plain speaking on subjects often slurred over and misunderstood. No one who loves South Africa, no one concerned in the welfare of the Empire, should neglect to read this book. Like Sir Percy Fitzpatrick's 'Jock of the Bushveld,' it goes straight to the heart of things.

F. R. C.

South-West Abyssinia.

'Au Pays Ghimirra: Récit de mon voyage à travers le Massif éthiopien (1909–1911).' Par Dr. George Montandon. Neuchâtel: Attinger Frères. 1913. *Illustrations, Maps, and Diagrams.*

This book (which forms vol. **22** of the *Bulletin de la Société Neuchâteloise de Géographie*) is the definitive record of a journey chiefly noteworthy for the elaborate anthropometrical details given concerning the Gemira—a people not

previously studied scientifically. The author's interests are, however, many sided, and the account of the Ghimirra (as he calls them) occupies but a fourth part of his volume. Readers of the paper Dr. Montandon contributed to this *Journal* (vol. **40**, pp. 372 *seq.*) will be acquainted with the main outlines of his expedition and the considerable amount of geographical work he accomplished. In his book we have the details filled in and much new matter added. He is to be praised for the critical apparatus he has provided. Besides the map showing the geographical results of his mission (a reproduction of the map given in this *Journal*), sketch-maps exhibit the various ethnic elements and languages spoken in the Abyssinian empire and also the religions of the peoples. Another map gives the itineraries of the explorers of south-west Abyssinia from 1843 onward, and there is a "profil du massif éthiopien" from the Hawash to the Akobo, in which by a clever contrivance we get at a glance the character of the country (altitude, rainfall, etc.) as it varies from zone to zone, together with the type of inhabitants, their language, religion, and social state.

The general reader may find of most interest the information concerning the condition of Abyssinia and the sketches of the principal personages in the empire, the analysis of the prospects of commerce, and the accounts of political intrigues. It is, in fact, a book full of varied entertainment; a veritable medley, as is natural when one deals with Abyssinia. But the information is so well arranged that with the help of the table of contents the reader can turn at once to the particular subject which mainly attracts him. The book should be consulted by all students of Abyssinian affairs.

F. R. C.

Zubeir Pasha.

'Black Ivory and White; or, The Story of El Zubeir Pasha, Slaver and Sultan, as told by himself.' Translated and put on record by H. C. Jackson. Oxford: B. H. Blackwell. 1913. 2*s.* 6*d. net.*

This autobiography of the great ivory merchant of the Bahr el Ghazal throws considerable light on the history of the Egyptian Sudan, especially the conquest of Dar Fur, with regard to which the Egyptian official accounts have deprived Zubeir of the credit which was undoubtedly his. Zubeir early penetrated to the Nyam-Nyam country. Mr. Jackson dates this in **1859**; but it was probably two or three years later, as the return journey was made in **1863**. Mr. Jackson also antedates by a year Zubeir's journey to Cairo (p. 79). Such errors might, perhaps, have been avoided had he given us Zubeir's own Mohammedan dates. Of course, much of what Zubeir says must be taken with reserve.

F. A. E.

The Languages of West Africa.

'The Languages of West Africa.' By F. W. H. Migeod. Kegan Paul, Trench, Trubner & Co. London: 1911–1913. 2 vols., *each*, 12*s.* 6*d. net.*

Mr. Migeod's work is of permanent value, and it will be very long before our general knowledge of West Africa comes up to its level, but it is not easy in the pages of a geographical magazine to treat at any great length linguistic material of this variety and importance. The book, of course, has geographical value, because the distribution of languages is a necessary part of geographical study. Mr. Migeod, an official of the Gold Coast Colony, first went to Africa in 1898, to the lower Niger. Soon afterwards he was appointed to the Gold Coast, and began his language studies with the acquisition of Hausa, but in 1908 published an excellent study of the Mende language of north-east Sierra Leone and north-west Liberia, with some references to Vai, an allied speech of western Liberia.

In the work under review he discusses in a lucid and analytical manner a great many of the West African tongues, beginning with Songhai and Hausa, and ending with the Bube of Fernando Po. His range extends to the Kanuri of Bornu, to Fula, and to the Bambara of Senegal. Curiously enough, the only speech of which he does not seem to have grasped the real features, is the Bube of Fernando Po, which is emphatically a Bantu language, though it contains a very interesting semi-Bantu element, related to that in the languages of Western Cameroons on the Bantu borderline. His comparisons of this speech with that of the Gold Coast tongues are a little misleading. His best work is done in connection with the Mandingo family of languages and the three great language groups of the Gold Coast and northern territories (the Mossi region). He gives a good bibliography and makes many references to preceding authorities, not excepting the remarkable work (as it has proved to be) of M. Maurice Delafosse. Altogether, I consider Mr. Migeod's book to be one of such permanent value to students in that field of ever-growing interest—the Negro languages of Africa—that the belated appearance of this rievew may only serve to call renewed attention to an interesting and clearly written book, a book which may even possess a general ethnological interest as well as occupying a special position in philology.

H. H. J.

Pemba Island.

'Pemba: the Spice Island of Zanzibar.' By Captain J. E. E. Craster, R.E. London: Fisher Unwin. 1913. *Illustrations. Price* 12*s.* 6*d. net.*

The author undertook the survey of this island for the Government. The first outlook was discouraging. From the lighthouse on the north-west coast nothing was distinguishable but a dark undulating sea of treetops. On getting to work it was found very difficult to measure a base-line, but this was eventually completed along the coral beach, which was covered in places by several feet of water. The survey was eventually carried out with marked success in spite of the obstacles presented by the physical character of the country and the opposition of the natives. There were no main ridges which could be followed, but numerous deep valleys and ravines full of bush, which proved quite impassable on parts of the east coast. On the west side the mangrove swamps were difficult to cross and infested by noxious flies. The climate was generally hot, damp, and malarial. In order to expose a beacon to view a thick jungle of tall trees, mostly great acacias woven together into a solid mass by creepers and rubber vines, had to be cut down with the axe. The natives, in their precautions against witchcraft, added to the difficulties of the expedition by stealing the white cotton cloth used to mark the beacons.

AMERICA.

The Far North of Canada.

'My Life with the Eskimo.' By Vilhjálmur Stefánsson. London: Macmillan & Co 1913. *Maps and Illustrations.* 17*s. net.*

Mr. Stefánsson was already an experienced Arctic traveller when he started on his 1910–1912 expedition. His main purpose was to investigate the practically unknown region east of Cape Bathurst; the south-western portion of Victoria island was also visited. Various geographical discoveries, confirmations, and rectifications were made, and to Dr. R. M. Anderson, a trained naturalist, who joined the expedition, are due numerous observations on the zoology of

the regions traversed. Mr. Stefánsson's main interests are ethnological, and not unnaturally the Eskimo bulk largely in this most interesting book. The author has a good deal to say about the right method of travelling in these inhospitable regions, and emphasizes the necessity of living in the same manner as the Eskimo—living on the country is his precept and practice. For example, Sir John Franklin's company "starved helplessly and died to the last man in a country as well supplied with food and fuel as was that where Rae spent his winter in comfort. . . . At the very time when these Englishmen were dying of hunger there were living all about them Eskimo families who were taking care of their aged and bringing up their children in comparative plenty, unaided by the rifles and other excellent implements which the Englishmen had in abundance." He has definite views as to the best method of dealing with frost-bite, and maintains that to keep the face from freezing it must always be clean shaven. He adds that the Eskimo physically is not better fitted for withstanding cold than are we, but he knows how to take care of himself.

Mr. Stefánsson knows the Eskimo intimately through living with them and speaking their language, which is "exceedingly difficult for a European to learn," and as he made many good friends among them we have an intimate and sympathetic account, not only of Eskimo who have been in contact with white men, but also of those who had previously never seen an alien. The book abounds with facts that interest ethnologists, the daily life, manufactures, migrations, religion, and psychology of the natives being dealt with, as well as their personal appearance; the so-called blond Eskimo of Victoria island naturally receive especial mention. Among the most suggestive remarks are those made about the strange developments resulting from the spread of Christianity; these should be carefully considered by those interested in mission work, or in the effects produced by the contact of different religious beliefs and practices. In secular matters also the coming of the foreigner with his prejudices is not an unmixed blessing. The encouragement to build frame houses has been pernicious. The Department of Education in Washington instructed a school-master at Wainwright inlet to encourage the Eskimo to dig coal for heating their houses, "and that they might earn money with which to buy flour to eat instead of the seal meat and walrus which was their ordinary diet. It is hard for me personally to put the point of view of a man who thinks that coal-mining is a more desirable occupation than seal hunting. . . . One of the effects of civilization will be that when they [the Eskimo of Victoria island] learn to use sheet-iron stoves they will in the course of two or three years burn all the wood that centuries have stored on the beach, exactly as the people in the vicinity of Point Barrow have done, and they will then, like the Point Barrow people, be under the necessity of importing wood when they need it to make the things that they can now make out of driftwood which they find on the beach." The book is written in an attractive manner and is well illustrated; it ends with a valuable report by Dr. R. M. Anderson on the natural-history collections of the expedition.

A. C. H.

Cotton Manufacture in the United States.

'Harvard Economic Studies.' Vol. 7. 'The Cotton Manufacturing Industry of the United States.' By M. T. Copeland. Cambridge, Mass.: Harvard University. 1912. *Price* $2 *net.*

There are many points of geographical interest in this monograph. The early manufacturing industry of New England was generally influenced by the

existence of water-power, which at the present day is less important than steam. In the south of New England the rapid growth of the cotton industry was due, not to water-power, but to the advantage in transportation held by tide-water cities through obtaining coal at lower rates. In the case of New Bedford, an additional reason for success appears in the marked humidity of the climate and the capital available for investment in the cotton mills which had been accumulated by the successful whale fishery.

There has been a most important industrial development in cotton in the Southern States during the last thirty years.

The author enumerates and criticizes the reasons usually given for the progress. (1) Proximity to the source of supply of raw cotton. (*a*) Saving in freight on raw material; (*b*) the advantage obtained through the power of choosing favourable market conditions. On the whole this is unimportant, as the price of cotton is ruled by the New York market. At present the Northern States have an advantage in the finishing of the cloth (bleaching, dyeing, and printing), as the water of the south is not suitable. In addition, the long staple cotton is not grown near the southern manufacturing region. (2) Saving in cost of power. The author states that less than one-quarter of the southern mills have water-power. (3) Less taxation. This is of importance, but the greater dispersion of the mills makes the work more expensive in the south. (4) Cheap and tractable labour. This is the corner store in the economic success of the south. There is a steady supply of "poor white" labour from the mills and farms of the Piedmont district. Many of these labourers are of Scotch or Scotch-Irish descent. Before the Civil War these mountaineers and tenant farmers were confined to the infertile regions because they could not compete with the plantation system and become wage earners. The abolition of slavery entirely altered the economic conditions. The industry has been largely dependent on excessive hours of labour (though these are now less) and the employment of children. A. W. A.

Latin America.

'The Republics of Central and South America.' By C. Reginald Enock. London: Dent. 1913. Pp. 544. *Maps and Illustrations.* 10*s.* 6*d.*

The author of this book has a strong belief in the value of the study of human geography, the principles of which he applies to good purpose. The unity of Latin America is insisted upon, and a first chapter of over fifty pages, replacing the perfunctory topographical survey usual in such works, treats the whole area as a unit from physical, social, and economic points of view. It deals in vast figures; it brings home, as works on the separate Latin American republics cannot, the important place which Latin America occupies in the world, and incidentally the enormous extent of British interests involved in its welfare and development, besides indicating (as the writer is concerned to indicate throughout) the future potentialities of that development. The republics are subsequently grouped for detailed study according to large geographical divisions —those of the River Plate, the Andes, and Central America being treated in succession. The writer has naturally summarized his own previous work in different departments, as, for example, when he devotes chapters to the archæology of the Incas, and the Aztecs and Mayas. The present study is in no direction profound; its purpose is of a general character, and its principal conclusions are generalizations, but as a book of reference to Latin America at large it fills a place. The maps, undistinguished in point of technical production, are well chosen and sufficiently clear, but the proofs needed closer revision;

misprints and loose sentences are not few, and (to take an illustration) a map is named in the contents pages which has escaped from the place therein assigned to it. There are some very good photographs.

The Argentine.

'Argentinien in geographischer, geschichtlicher, und wirtschaftlicher Beziehung.' By Wilhelm Schmidt and Dr. Christian Grotewold. Hannover: Hahnsche Buchhandlung. 1912. Pp. 397. *Illustrations.* 13*M.*

There is much of interest to the geographer in this monograph on the modern economic development of the Argentine. The physical geography of the different provinces is adequately dealt with, and two useful sketch-maps have been inserted, giving representations of rainfall and temperature through the year.

The section devoted to methods of agriculture is especially illuminating. In the wheat districts, which extend over most of the Pampas, the methods at present employed are those usual in new lands, where land is cheap while labour is dear, and irrigation and the use of manure are only practicable to a limited extent. An Italian labourer coming over from Europe during the slack season at home, November to March, can save 800 marks.

Such lands only produce about one-third of the yield per acre obtained in England or Germany by intensive cultivation. As the soil of the Pampas is light and free from stones, enormous stretches can be ploughed and sown by a single farmer. In a normal holding of 100 hectares (·386 square mile), a furrow can be driven a length of nearly 1000 metres. Long hours are necessary, but there are considerable periods of rest (from August to September, or the middle of October, before the harvest, and after the harvest in February). Owing to the dry climate threshing can be done at once on the field by machinery. Cattle do not have to be looked after in the winter as in Europe or Canada, and owing to the absence of forests, there is no wood cutting. When plantations have grown up the needs for burning are usually supplied by windfalls.

The authors emphasize the importance of dry farming, and point out the advantages of not being dependent on a single product. Both wheat and maize should always be grown, and lucerne, which defies the drought, and is of great value for cattle, which are still the main source of national prosperity, though the large runs are diminishing.

AUSTRALASIA AND PACIFIC ISLANDS.

The New Hebrides.

'Two Years with the Natives in the Western Pacific.' By Dr. Felix Speiser. London: Mills & Boon. 1913. *With* 40 *Illustrations from Photographs and a Map. Price* 10*s.* 6*d. net.*

There is a German edition of this book, entitled 'Südsee, Urwald, Kannibalen,' published by R. Voigtlander of Leipzig, which has a somewhat fuller text, and a considerably larger number of illustrations.

Dr. Speiser, who has recently spent two years in leisurely wanderings among some of the larger islands of the New Hebrides group, and the adjacent Santa Cruz islands, has in this book collected a series of very vivid sketches, some of which have already been published in newspapers, of his personal experiences in those parts, where folk of almost the most primitive type are struggling for existence under the new and utterly strange conditions which have been imposed by the advent of European pioneer settlers, of missionaries

of many different churches, and of those other white men who are struggling to carry out, in those islands, the ingenious political experiment which is known as the Anglo-French condominium.

The book is certainly the best available account of the conditions as yet brought about in the islands by abrupt application of European political ideas to the natural conditions which till lately there prevailed. It is also distinctly interesting as a simply told story of travel under modern conditions in one of the least-known parts of the world. It might, however, be made much more useful to the more studiously inclined reader, by the addition of an index, which should be fairly full, and by the substitution of a much better map for that which it now has.

Special attention may be called to the account Dr. Speiser gives of the admirable and beautiful medical-mission station at Dip point, on the island of Ambrym, which, as mentioned in the February number of this *Journal*, within the last few months has been overwhelmed by an especially violent eruption from the mighty double-cratered volcano at the very foot of which it stood; to the first ascent, by the author, of the peak of Santo, which, though only 1500 metres high, is the loftiest point in the New Hebridean group; to the interesting, but rather inadequate, account of the race of pygmy men which Dr. Speiser claims to have discovered in the interior of the same island of Santo, dwelling about its peak; and to the potter's art said to be practised at two villages in Santo, and nowhere else in the New Hebrides. The last-named incident is especially interesting when it is remembered that in 1606 Quiros, the first European to visit the island in question, makes special reference to this local art.

A special word of praise is due to the photographs, which, perhaps especially in the German edition, are exceptionally good and interesting; and here, if I may venture "to look a gift horse in the mouth," I cannot help especially regretting the exclusion from the English edition of the snapshot of the "coconut crab" on its palm trunk.

Finally, it must be noted that Dr. Speiser in his preface holds out hope that scientific description of the matters popularly told in this book will appear later. Just because of his high appreciation of the present book, the writer of this notice looks forward to that further publication.

E. IM T.

AUSTRALIA.

'Australia from a Woman's Point of View.' By Jessie Ackermann. London: Cassell & Co. 1913. Pp. 317. 64 *Plates*. 6*s*.

Miss Ackermann's experience of life in Australia has been spread over a long period, and her travels have taken her over most parts of the Commonwealth. Her opinions are stated decisively and with a breadth of outlook which is inspiring. She sees a new country in the making, raw and crude, but with the elements of progress, weighted down at present by the necessity which faces the individual Australian of looking personally after his own interests. Individualism is the keynote of the Australian situation, but this individualism means little more at present than slavish imitation; there appears to be a conspicuous absence of ability to develop along lines which the peculiar circumstances of the country necessitate.

Hard personal labour, usually at tasks which tend to cramp the powers of the individual, tending to the neglect of education both at and beyond the school age, leaving little time for leisure or for leisured pursuits, throwing an

excessive burden upon the women of the country, keeping the best men out of the service of the state, and preventing that division of labour which serves to improve the character of the community as a whole, is the main impression which this book conveys. Life in the back-blocks is hardest, and the reaction against the tyranny of the vastness of the land is responsible for the intense energy of the people when they find time for amusements, an energy which is displayed by the barracking of the crowds on the cricket field, by the hooting and shouting of the audience at places of amusement.

B. C. W.

GENERAL.

Alexander Agassiz.

'Letters and Recollections of Alexander Agassiz.' By G. R. Agassiz. London: Constable & Co. 1913. *Price* 14*s*.

This is a charming life of a simple and most lovable personage, told largely by his own letters to his relatives and intimate friends, a son's tribute to a loving father, who by his attainments belonged not only to him, but to the world at large. That father was a correspondent of Darwin, Huxley, Wyville Thomson, Milne-Edwards, and a host of others. Some of them were giants while he as yet was young. He sat at their feet, but it was clear that he was even then determined that others should occupy a like seat in respect to himself. With all his tastes in natural history, with his love of gaiety and athletics —he rowed in the first racing-shell ever seen at Harvard—Agassiz pursued a steady course to this end. He recognized that his salary as a man of science would be insufficient for the support of a family as well as for the continuation and publication of his original work. He had been trained in mining as well as zoology. He was attaining a world reputation for his zoological researches when his chance came. The story of his development of the Calumet and Hecla mine, as told by his letters, is a thrilling one. It may be truly said that "he made it," while up to his death he presided over its destinies, moulding it into one of the greatest industrial undertakings in America. It gave him means beyond his dreams, wealth which, with his clear line of thought, he wisely expended for the benefit of his fellow-men by promoting the increase of natural knowledge—geographical by many great expeditions, and zoological by the development of a great museum and school at Harvard.

Agassiz in his early life was a zoologist. His researches on jelly-fish (*Medusæ*) and on star-fishes are classical. More than forty years ago he artificially fertilized the eggs of the latter, and reared them through complicated larval stages to the adult condition. He traced their relationship to various forms of worms, working out the cycles of development of the same. He was not merely an embryologist and classifier; it is clear that he loved the living beasts, as his researches on the functions of organs in star-fishes amply testify. Of Darwin's views he was frankly sceptical. He writes of the "Lamarckian theory which was brought to life again by Darwin."

The hard work entailed at the Calumet and Hecla broke up Agassiz's health, and to this we owe his conversion to bio-geographical work. His first exploration, largely undertaken in search of health, was that of Lake Titicaca, and it reveals methods little improved upon to-day. In his investigations on the 'Three Cruises of the *Blake*' he introduced many improvements, among them the use of wire ropes and closing nets. The reefs of Florida and the Sandwich islands (now the United States Territory of Hawaii) claimed his attention. From these he returned to an investigation, largely on the *Albatross*, of the

relationship of the Caribbean fauna with that west of the isthmus of Panama, the results of which are not yet completed.

For the remainder of his life Agassiz devoted himself to the questions of coral reef formation. He further explored Florida, and thence extended his researches to Cuba, the Bahama group, and Bermuda. He considered the last two to be largely of æolian origin, and ascribed their present topography to the action of physical conditions rather than to the œcology of their reef-organisms. Agassiz then set out to examine the Pacific ocean reefs. On the Great Barrier reef of Australia he was not successful owing to the strong trade winds; but his next investigations, seconded by those of his assistant, E. C. Andrews, threw a flood of light upon the elevated limestone islands and the existing reefs of Fiji, where perhaps the greatest variety of forms both in land and reef is seen. The next expedition comprised the Marquesas, Paumotu, Tahiti, Tonga, Fiji, Ellice, Gilbert, Marshall, Caroline, and Ladrone groups, a subsequent expedition proceeding to Easter island and examining the South Pacific. The Maldive expedition in the winter of 1901–2 was his sole excursion into the Indian ocean.

Agassiz lived to complete an examination of the coral reefs of the world, but necessarily, as he himself recognized, his work was hurried—a survey to be followed up later by others. Wherever he went he sounded and collected, and these collections he deposited at Harvard, where he desired to found a museum mainly for research. Year by year for fifty or one hundred years, as these collections are worked out, they will build up a further tribute to one whose "stupendous scientific achievements are recognized as equal in amount to many men together."

J. Stanley Gardiner.

Educational Books.

'Principles and Methods of Teaching Geography.' By F. L. Holtz. New York: The Macmillan Co. 1913. Pp. 359. *Maps and Diagrams.*

The general reader will turn to three chapters towards the end of this book which deal with the evolution of geographical knowledge, the history of the science of geography and of its pedagogy, and some American text-books of geography, from the date *c.* 1774.

The book is American both in its outlook and its methods—in outlook, since the pupil is to be trained in patriotism and good citizenship by special attention to the home country; in method, since it is primarily intended for the American teacher. Probably on both these grounds it will be well for the English teacher to study it; in the first place, in order to realize how geographical environment affects even the teaching of geography. We, in the centre of a world trade and with a world outlook, teach either imperially or with a greater and more scientific world survey; they, within the bounds of an almost self-contained community, teach the home country as the main theme and use world facts as illustrations. In the second place, the different outlook engenders suggestiveness, in regard to which nothing is probably more valuable than the author's cautions as to the abuse of the causal principle and as to the fact that "the human reason, inclination, and even whim may be more important factors than the natural conditions." "It is worth while in geography to appreciate the 'effect of man upon nature.'"

'Commercial Geography of the World.' Part II. Outside the British Isles. By A. J. Herbertson, revised by J. Cossar. London: W. & R. Chambers. Pp. 272, with an Appendix of Statistical Tables of 80 pp. *Map.* 2*s.* 6*d.*

The second edition of Prof. Herbertson's well-known book has been brought up to date and revised by Mr. Cossar. The reference to "Commercial Intelligence" in the Preface should have been amended. Part of the book gives a general treatment of economic geography in relation to geographical principles, the greater portion, however, deals with the separate countries which are arranged in a regional order. The method of selection adopted is that of sampling; so that only in the most important countries is there an attempt at a full and complete account of the economic activities of the people in their geographical environment. The account of these activities does not, as a rule, specify whether the product is for local or for external consumption, nor the relative importance which the product of a particular area bears to similar production elsewhere. The statistical tables generally state for separate countries (i.) the different imports and exports by value; (ii.) the distribution of the trade, by means of average values for two periods. B. C. W.

THE MONTHLY RECORD.

EUROPE.

The Diluvial Lakes of Schleswig.—With the help of various other workers, Dr. G. Wegemann, of Kiel, has carried out a thorough investigation of the many small lakes strewn over the surface of the diluvial deposits of Schleswig. The results in the case of a few of the lakes had already been published in *Petermanns Mitteilungen* and elsewhere, but the first general account of the whole research and systematic summary of the results were given by Dr. Wegemann in the *Zeitschrift* of the Berlin Geographical Society, 1913, No. 8. The lakes, forty-three in all, are fairly regularly distributed over the surface, though falling naturally into certain regional groups. They may also be classified as belonging to the ground-moraine, the terminal moraine, and the "Sandur" formation. The height above sea-level is slight throughout, but greatest along the ridge of the terminal moraine, which forms the water-parting, and has an altitude of 40 to 50 metres. Only one has any considerable size, viz. the Wittensee, with an area of 10½ square kilometres. All are comparatively shallow, two only having a depth of over 20 metres. By reason of its size and relatively great mean depth, the Wittensee alone accounts for two-thirds of the whole water-mass of the inland lakes of Schleswig. As regards form, seventeen may be classed as channel lakes, nine as filling holes or pan-like depressions, while the rest are merely inundated flats, except the Wittensee, which partakes of the character of both the first two classes. Although the greater number lie only a few miles from the Baltic coast, nearly half (eighteen) are drained towards the North sea, only sixteen to the Baltic, and five are without outlet. Many of the lakes occupy portions of former glacial drainage furrows, with a general direction corresponding to that of the "Förden," viz. south-west to north-east; and most appear to owe their origin to evorsion and erosion by the sub-glacial water of the Ice Age. Cases of discharge in two directions are, however, absent, though common in Holstein, where the water-parting is less clearly defined. No fewer than sixteen of the lakes are "crypto-depressions," *i.e.* the lowest part of the hollow sinks below sea-level.

The Waterway between Milan and Venice.—The question of the improvement of interior navigation in Northern Italy has come greatly to the front within the past few years, and received a decided impetus from the Act (known as the Bertolini Act after the minister who carried it) passed in 1910 with a view to its encouragement and furtherance. One of the most important desiderata is the improvement of the waterway between Milan and Venice, by which this may be capable of navigation throughout by vessels of 600 tons. At the "Congrès National de Navigation Intérieure," held last year at Nantes, the question was discussed by M. Mario Beretta, Secretary of the 'Comité pour la Navigation Intérieure à Milan,' in a paper of which a reprint has been received. The course of the Po naturally forms the most important constituent of any waterway between the two places named, and its physical characters both in general and in the different sections of its navigable course are considered in detail by the writer. He holds that it offers conditions particularly favourable to navigation. Thus it receives a sufficient quantity of water at all seasons, thanks to the supplies received in winter and spring from the Apennines, in summer and autumn from the Alps. (Yet the figures given show that the volume in flood is about 3½ times that at mean level, and it is allowed that the amount of silt brought down from the side of the Apennines is a drawback.) The mean fall per kilometre of its bed compares not unfavourably with that of the Rhine, Danube, and other European rivers used for navigation. On the other hand, the bars which occur at various points are a hindrance, and in the upper sections the available depths are greatly reduced, and the rapidity of the current has to be reckoned with. Still, navigation is possible to vessels drawing up to 2 metres for 153 days in the year even in the highest section below the Ticino. Up to the mouth of the Adda vessels of 600 tons can navigate fully loaded for 217 days, and for 113 more with either a half or a quarter load. Among the steps needed for the further improvement of the channel, an important item would be the regulation of the torrential streams of the Apennines, to which so much of the silting is due; but this would be a work of many years. More immediate results are to be obtained from works for improvement of the low-water channel by dredging, embankment, etc., with a view to keeping open a 2-metre channel throughout the year as far as the confluence of the Ticino, and one of 1·60 metres for practically the whole year up to Monferrato. To complete the navigation from Milan to Venice two canals are needed—one from the Po above its delta to the sea, the other from Milan to Cremona, and schemes for these have already been laid down. The former provides for a new canal between the Po and the Adige, with a widening of the existing canal between the Adige and the lagoon; the latter suggests the construction of a new wide canal from Milan to the Adda, and possibly the canalization of the latter, as preferable to the reconstruction of the existing route *viâ* the Ticino. Another item in the general programme for the improvement of interior navigation is the construction of a fine new port for Milan to which reference was made in the *Journal* last year (vol. 42, p. 193).

ASIA.

Sir Aurel Stein's New Expedition.—Sir Aurel Stein, the first stage of whose new expedition to Central Asia was described in the *Journal* for December last, had already reached the neighbourhood of Lop-nor in January, after carrying out part at least of his proposed winter campaign in the desert. Writing from Camp Miran, Lop-nor, on January 19, he reports that he had seen a good deal of the desert, partly by new routes, but had been obliged to move quickly in order to be in time in reaching a corner of the Tarim basin to which the explorer is

drawn by a combination of geographical and archæological interests, and where work is possible only in the winter. He wrote from the site of the old Lop "capital," where he had succeeded in recovering interesting remains, and was then busy with preparations for a move through the desert north-eastward, with a view to pushing on into Kansu. Political conditions were still somewhat unsettled, but had not, so far, interfered with his work, though it was clear that the revolution in China had not changed things for the better in those parts. In spite of the advanced season and the severe cold, the triangulation along the Kuen Lun had been extended well to the south of Lop-nor.

Dr. Legendre's New Expedition.—The French traveller Dr. Legendre, whose explorations in the western borderlands of China have been frequently referred to in the *Journal*, has started on a new expedition to the same region, with the support of the French Government. He will endeavour to make good the collections and documents destroyed during the attack on his party in 1911, and will at the same time study the commercial conditions in the interest of French trade.

Mount Kinabalu.—Mr. J. C. Moulton, whose successful expedition to Mount Batu Lawi in the interior of Borneo was referred to in the *Journal*, vol. **38**, p. 530, has since made another to Mount Kinabalu for collecting purposes, and has described the trip in the *Sarawak Gazette* for November 1 and 17, 1913. The ascent of the mountain is now no such difficult undertaking as it was in the early days of the British connection with North Borneo; and it has been made fairly frequently of late years. Still the narrative of a trained naturalist like Mr. Moulton is of interest, and his notes on the nature of the country traversed, the climate, flora and fauna, etc., are useful. The usual route *viâ* the Tampassuk river and the village of Kiau near the southern foot of the mountain was followed, in company with Mr. Skene Keith, a North Borneo official, the ascent from this side being apparently the only one practicable owing to the sheer precipices which fall on all the others. Considering the relatively moderate altitude of the mountain (about 13,500 feet), the extent to which the party suffered from mountain sickness is somewhat remarkable. Some of the native porters were obliged to turn back on this account; and the Europeans found it necessary to halt for breath every few yards. All the party suffered considerably from the rawness of the atmosphere, and one native succumbed to the cold when attempting to reach Mr. Moulton's camp. The summit consists of a huge mass of granite, almost devoid of vegetation, with the exception, in one part, of stunted rhododendron bushes. After some days on the higher slopes the party moved down to the entrance of the wild gorge of the Kadamaian river, which Mr. Moulton considers a comparatively recent feature, to the formation of which may possibly be due the draining of the lake connected by legend with the mountain. This proved an excellent collecting ground for butterflies, dragon-flies, and beetles. At Kiau measurements of a number of natives were taken, the average height of the men being found to be 5 feet 0½ inch, while their span reached 5 feet 3½ inches. The return to the coast was by a direct route across the lowlands. Mr. Moulton refers to the various derivations of the name Kinabalu which have been suggested, that to which his own opinion inclines being from the Dusun word Nabalu, "resting-place of the dead."

AFRICA.

French Work in the Lake Chad Region.—Commandant Tilho, whose new mission in the Lake Chad region was mentioned last year in the *Journal* (vol. **42**, p. 297), has sent to Prof. Cordier a brief account of a reconnaissance in the "low country" north-east of the lake (*La Géographie*, December, 1913).

The tracts visited were found to be free from danger of raids, thanks to the check inflicted on the Senussists a month before by Lieut. Dufour. From near the lake the itinerary led by a considerable circuit through Tuntuma, Egei, Toro, and Jurab to a point on the dry valley of the Bahr el Ghazal, the return being by a rather more direct route. The positions of some of the spots visited were fixed for the first time, and besides the topographical work, astronomical and meteorological observations, altitude determinations, and a collection of fossils were made. At Tungur, on the Bahr el Ghazal, the remains of an elephant's skull were found buried in the sand—a proof that the district must once have been well provided with water and pasturage; and other interesting finds were collections of chipped flints, broken pottery, lance and arrow heads, old sword-blades, and remains of garments, showing that the locality was formerly habitable. Commandant Tilho afterwards took part in Colonel Largeau's successful campaign against Borku, which resulted in the occupation of Ain Galakka, and opens out the prospect of a further harvest of geographical results from this almost unknown region. Another officer, well known for his hydrographical work in Lake Chad and elsewhere, Naval-Lieut. Audoin, was last year entrusted with a new mission, with a view to the study of the possibilities of navigation on the northern affluents of the Shari. Should they be found navigable, it is thought that they may afford a feasible route for the despatch of supplies to the eastern parts of French territory, near the borders of Darfur.

Depths and Shore Deposits of Lake Tanganyika.—We alluded recently to soundings by a German officer, Captain Jakobs, which had revealed depths in Lake Tanganyika greater than had been previously established (*Journal*, vol. 42, p. 572). The highest figure obtained by Captain Jakobs appears to have been exceeded by one resulting from soundings previously taken by a Belgian savant, Dr. Louis Stappers, during a voyage on the lake in 1912–13. Dr. Stappers gave a brief account of his results in the *Revue Congolaise* for September, 1913. Although no great number of soundings was taken by either investigator, the sections were made in different localities, and the combined results supply for the first time a fair indication of the configuration of the lake-bed. This shows a transverse ridge about the middle, dividing the lake into two deep basins. On the ridge the greatest depth found was 600 metres, while at one spot it fell to 136. The greatest known depth of the northern basin is the 1277 metres found by Captain Jakobs, while an extensive area shows depths of more than 1100 metres. In the southern basin Dr. Stappers obtained a sounding of 1435 metres (4708 feet), and established the fact that this southern portion is traversed by a very deep valley. In reference to the central ridge, he mentions the native tradition (recalling those spoken of by Stanley *) that Tanganyika formerly consisted of two lakes separated in about the latitude of 5°. Dr. Stappers has a second paper in the same *Revue*, in which he traces the changes observed by him during a complete year in the embouchure of the considerable river Lobozi, which enters the lake on the west in about 7° S. after draining the eastern portion of Marungu. The transformations observed are the resultant of four distinct factors, viz. the changing volume of the river, the amount of matter in suspension, the direction and force of the winds, and the action of the surf. The bar formed off the mouth of the river was found to increase greatly from March onwards (when the river was bringing down a large body of water with suspended sediment), but whereas in April and May the violent winds from

* 'Through the Dark Continent,' vol. 2, pp. 12–16.

the south-east threw up the sand and shingle to the right of the river mouth, causing the river to find an outlet by a sharp bend to the left, the north-easterly winds that set in in October had precisely the reverse effect, the bar now blocking the former exit to the left and causing a new one to form with a sharp bend to the right. The action of the surf in throwing up shingle is most active in June and July, when the mouths of many of the smaller streams become entirely blocked in this way. The paper is accompanied by photographs illustrating the features described.

Proposed Works for the Regulation of the Congo.—An ambitious scheme for the improvement of the *régime* of the Congo by the construction of dams at the outlets of lakes or in river gorges, so as to store up a water-supply at one time of the year for utilization at another, has been put forward by Captain Robert Thys, in a memoir published by the Belgian 'Compagnie du Congo pour le Commerce et l'Industrie.' The author, who has had charge of a 'Mission des Forces Hydrauliques du Bas-Congo,' describes the purpose of the memoir as to show "how, in a few years and for a few millions, we may impound, by barrages, in the present and former lakes of the Congo, about 67 milliards of cubic metres of water in the rainy season, to return them in the dry," and so not only greatly benefit navigation in the various sections of the river, but reduce the extent of the inundations, and provide an enormous reserve of water-power for use in the mining regions. Captain Thys allows that precise data for the solution of many of the questions are wanting, and that exhaustive investigations in many different localities would be a necessary preliminary to the adoption of any such scheme by the Governments interested; but he is confident as to its possibility, and endeavours in the present publication to arrive at provisional conclusions from the data yet available. These, it must be confessed, are hardly sufficient for the purpose of a trustworthy conclusion, and much of the author's reasoning depends on generalizations from but scanty evidence. The most important items of his scheme are no doubt the proposed barrages at the outlets of Lakes Tanganyika and Mweru. Before discussing these in detail, Captain Thys puts forward some general ideas as to the available rainfall over the Congo basin and the intensity of evaporation and soakage. Much of this is necessarily guesswork, so that the final conclusion that an average of 9 litres per second, per square kilometre of surface, is available for storage, does not inspire very great confidence. Little account is taken of the differences which certainly exist between different parts of the basin, and as the catchment area of Tanganyika seems likely to fall considerably behind the more western area in water-resources, there would seem grave doubts whether the supply taken as available during the rainy season to raise the level of the whole lake by 1·35 metres (4·43 feet) would really be forthcoming. No attempt has yet been made to estimate accurately the amount discharged by the Lukuga during the year, but we know that the outflow from the lake is frequently reduced to quite small proportions, while the fluctuating level of the lake from year to year points to great irregularity of supply. In this case and in that of Mweru the facilities for the building of a dam are no doubt great, by reason of the narrowness of the furrows by which the water escapes. The gorge of the upper Lualaba would seem also to lend itself well to the purpose, but the data regarding the form of the basins supposed to be capable of being filled, in this and similar cases, seem at present very insufficient. The proposals may still, however, be worthy of further investigation.

Astronomically fixed Positions in the Gabun.—The coast of French Equatorial Africa has down to the present been particularly badly off as regards the accurate determination of positions, the charts in use still depending to a

large extent on the work of Captain Owen and others early in the nineteenth century. No trustworthy connection between any point on this coast and the general network of the world's mapping had been made, for though the difference of longitude between Libreville and Kotonu was fixed by the telegraphic method as far back as 1890, no precise connection between Kotonu and any other point of which the longitude is accurately known appears to have been yet made. Apart from such a connection with the rest of the world, the actual charting of the coast, except for the Gabun estuary, was likewise exceedingly faulty, as was proved in the course of the recent Hydrographical expedition, and the operations for the laying of a cable between Libreville and Pointe Noire *viâ* Cape Lopez. The want has, in part at least, been met by the labours of a mission under Lieut. Le Terrier, who has given a full account of the methods and results of his work in *La Géographie* for December, 1913. The operations were carried on under considerable difficulties, the atmospheric conditions on this coast being particularly unfavourable for astronomical work. For instance, at Pointe Noire it was impossible for six months to obtain a single morning observation of the sun, and almost equal difficulties were encountered in observing occultations of stars by the moon. The results, therefore, are not in every case so satisfactory as might have been wished, but there is no doubt that they mark a great advance on anything done here before. The task consisted in determining the positions of a series of points on the coast and on the lower Ogowe, which might serve as a framework for future surveys. The instruments used were two prismatic astrolabes, of different sizes, and a Brunner theodolite reading to 10″, and all three gave entire satisfaction. As the foundation of the whole work the absolute longitude of Pointe Noire (near Loango) was first determined, and the difference of longitude between this and other points was then obtained in various ways. The absolute longitude was derived (1) from observations at Pointe Noire itself (these were much hindered by atmospheric conditions —only one occultation being secured—the result depending on five observations of equal altitudes of the moon or stars); (2) from observations at Manji (near Cape Lopez), transported to Pointe Noire by telegraphic difference of longitude between them; (3) from the previously accepted value for Libreville, likewise transported to Pointe Noire by telegraph. (This value for Libreville depended on an old observation of Fleuriot de Langle in 1844.) The final result adopted is 0h. 38m. 1·35s., or 9° 30′ 20·3″ E. of Paris, or about 11° 50′ 35″ E. of Greenwich. The subsequent differences of longitude were determined by exchange of signals and by transport of time. Full particulars are given in the paper.

German Expedition to the Libyan Desert.—The young German geographer, Dr. Ewald Banse, has started on an expedition for the exploration of the Libyan desert, which has been in contemplation for some time. He is making his way to Siwa oasis, which he has chosen as his starting-point, by a new route. A summary of our knowledge of the desert, based on a thorough study of all available literature, is appearing in *Petermanns Mitteilungen* (1914, March and April, with map), from his pen.

AMERICA.

Mr. J. B. Tyrrell's Expedition to Hudson Bay, 1912.—This expedition, undertaken under Government auspices for the purpose of selecting the enclaves granted by Manitoba to Ontario in 1912, and of examining the nature and resources of the district of Patricia allotted as an extension of Ontario's former territory, was referred to in the *Journal*, both at its inception and completion. A detailed account of the expedition has now appeared in the 22nd Report of the

Ontario Bureau of Mines, a reprint from which has been received, accompanied by maps. Mr. Tyrrell engaged as assistants Prof. Lewis B. Stewart, of Toronto University, as surveyor, and Mr. W. B. McPherson as assistant surveyor, two other white men and six Indian canoemen making up the *personnel* of the expedition. Mr. Tyrrell proceeded to the bay by way of Norway House, the Nelson and Hayes rivers, a large-scale survey of the last-named below the junction of the Shamattawa being made by Prof. Stewart, while Mr. Tyrrell went up the Shamattawa to examine the country on its banks. In accordance with the agreement between the two states, a frontage of 10 miles on the east side of the lower Nelson (to which Prof. Stewart extended his survey) was chosen for Ontario, and marked with posts and mounds. From this frontage a strip of 5 miles in width had to be drawn eastward to the western boundary of Ontario, to provide a line of route for a future railway. A suitable crossing of the Hayes river could not be found until 33 miles above its mouth, and the 5-mile strip was, therefore, bent southward so as to take advantage of this crossing. Its demarcation further east could not be carried out in the time available, and, on August 26, Mr. Tyrrell with one of his white assistants and four Indians started home by a new route, ascending the Severn river and various lakes and rivers connected with it. From Trout lake southward across the height of land to Cat lake on the waters of the Albany, the route was one previously used by Indians only, so that here a piece of actual exploration was accomplished. Ascending a small stream to the higher land between the Severn and Wenisk rivers, on which are a number of lakes, the party travelled south on the western side of the divide through a chain of lakes. This route leads through small streams and over many long and swampy portages, and seems to be used by the Indians on account of the abundance of fish in the lakes, game too being probably moderately plentiful. Whether it is preferable, for large canoes, to the main course of the Severn is uncertain, this latter being still largely unexplored. From his own observations and information collected Mr. Tyrrell describes the district of Patricia as a fairly distinct physiographic unit, its highest portion consisting of a rocky granitic plateau with an elevation of 1500 feet. Hence it slopes gently southward to Lac Seul, depressions in its rocky surface being occupied by numerous lakes. Northward the slope is somewhat steeper, and here the rock basins are mostly filled with glacial clays and other surface deposits, with some lakes occupying depressions in these. This northern country is very new geologically, and, in the absence of well-marked valleys, large areas are undrained and covered with peat bogs. The district does not seem to be heavily forested. The native population is scattered and consists of Crees and Ojibways, whose staple food is fish. In its present condition the country is uninviting, but, with drainage, the clays, etc., would seem to offer agricultural possibilities, given a suitable climate, as to which little is yet known. The report ends with an account of the main rivers and an outline of the geology.

The Territory of New Quebec (Labrador Peninsula).—The Department of Colonization, Mines, and Fisheries of the Province of Quebec has lately issued a well-illustrated volume on the general geography of the above region, though special prominence is given to physical conditions. In November, 1912, a Bill was passed by the Legislative Assembly of the Province of Quebec erecting the territory of Ungava under the name of New Quebec. This embraces the mainland north of Quebec province between 53° and 62° 30′ N. lat., and 56° and 79° W. long., with the exception of the north-east coast known as Labrador, which falls under the jurisdiction of Newfoundland. The peninsula is a high rolling plateau, rising abruptly from the Atlantic coast to heights between 1500 and 2500 feet, very gradually from the side of James bay, but steeply from that of

Hudson bay. The climate ranges from cold temperature in the south to Arctic on Hudson strait and the high lands of the northern interior, and is generally so rigorous as to be unfit for agriculture north of latitude 51°, except on the low grounds near the coast. From the records of the North-West River post of the Hudson Bay Company it appears that −45° F. is the ordinary winter minimum, whereas in the Scottish highlands in similar conditions of latitude and elevation it is only in exceptional frosts that the temperature falls as low as −20° F. The ice in Lake Winskapau, in the deep valley of Hamilton river, was found from measurement to reach a thickness of 4 feet 9 inches. In summer the temperature north of Mistassini rarely rises above 80° F. on more than a few days. North-west winds blowing in Labrador for three-quarters of the winter are reported to bring a bright clear atmosphere, so it may be concluded that there is not felt that *raw* quality of cold which is the distinguishing feature of the warmer but stormier British winter. Over the greater part of the peninsula the soil is derived from the underlying Archæan rocks, and consists of glacial till (sand and clay) mixed with boulders. The southern half of the peninsula is included in the "sub-Arctic forest belt" of Prof. Macoun. It is thought that the trees in the more favourable parts will in the future furnish a profitable lumber industry. The total population of the peninsula is 14,300 (1 per 35 square miles), made up of 8800 white settlers, 2000 Eskimo, and 3500 Indians. The fisheries of the numerous lakes and rivers and adjacent seas are very valuable, though largely unexplored. There is little likelihood that the region will ever be a grazing country on account of the general covering of moss and lichens, and absence of grass plains. With the disappearance of the snow and ice in summer, the temperature rises so rapidly that the leaves are almost immediately put forth by trees and bushes. The extreme rigour of the climate of Labrador in the same latitude as the British islands is commonly attributed to the flow of Arctic water along the coast. This must certainly help to refrigerate the coast, but there seems no doubt, in the light of further knowledge of the country, that the inclement conditions are due primarily to the high general altitude of the plateau. It is interesting to note in comparison that in the Scottish highlands, where the same general altitude prevails as in Labrador, we find much the same barren desolation and difficulty in raising even the hardiest food-crops under general climatic conditions which are little better than sub-Arctic. But, on the other hand, the conditions of southern England would, no doubt, be impossible in lat. 50° in Labrador even should there exist a similar extent of low-land area.

Desolation Island, Straits of Magellan.—Mr. W. S. Routledge, whose expedition to Easter island, referred to in the *Journal* for May, 1913 (vol. 41, p. 494), has been delayed by unforeseen circumstances, writes from off the Chilean coast under date February 12, 1914, giving some particulars of an examination by him of one of the multitude of imperfectly known channels by which the land is broken in the region of the Straits of Magellan. The systematic surveys of the Chilean Marine, to which reference was made in the January number (p. 84), have done much to supply accurate knowledge of the labyrinth of islands and channels of this region, but they do not seem to have yet dealt with the little-known southern side of Desolation island, south of the western entrance to the Strait, to which Mr. Routledge's note refers. As indicated on the latest Admiralty chart, many of the channels which intersect the coast of the land complex bearing the name Desolation island have never been examined, and it is quite probable that the supposed island (as has been found by the Chileans to be the case elsewhere) is really composed of a number of separate units. While the schooner-yacht *Mana* was detained by weather at Port Churruca on the north side

of the island, Mr. Routledge examined the harbour by means of its motor launch, and at the head of the Lobos arm (shown on the Admiralty chart) found an Indian portage which had evidently been much used in the past. It led by easy gradients, by a track cut through the forest and crossed by transverse tree-trunks at intervals of about 4 feet, across a narrow isthmus, only 160 yards wide. Beyond was a sheltered cove with smooth shelving beach, from which a fine sheet of salt water extended to the south-east. This was traced down some 8 nautical miles, between snow-capped granite ranges 2000 feet high, to a point where a second channel came in from the north-east, the width of the first averaging from half to three-fourths of a mile. A view from a hill at the junction showed the combined channel to be continued for 3 or 4 miles in the same direction, after which it entered a large sheet of water approximately at right angles. Beyond this water mountainous land was visible, which would seem to represent Redwood and adjacent islands, the fiord being presumably Dynevor sound. Thus, apart from the narrow isthmus above referred to, Desolation island will here be divided in two, and Mr. Routledge points out that a knowledge of the fiord at this point, almost connecting the Pacific ocean with Magellan strait, might be of much importance to the crew of a vessel lost to the south of Cape Pillar, as it would give easy access for boats to Port Churruca.

POLAR REGIONS.

Mr. Stefánsson's Expedition.—Writing from Point Barrow, Alaska, on October 29, 1913, shortly after his separation from the party on the *Karluk*, Mr. Stefánsson gave an account of the arrangements made by him for the prosecution of the objects of the expedition, and the modifications involved by the mishap to his principal vessel. The *Karluk* and *Mary Sachs* had sailed from Port Clarence on July 27, leaving the *Alaska* behind for repairs to her engines. According to the programme laid down, the *Karluk* was to explore the region west of the Parry islands, sailing north about the 141st meridian until checked by ice or the discovery of land. In the former case the edge of the ice was to be followed eastward to a base either on Prince Patrick island or on Banks island; in the latter case a base would be established upon the new land. The *Alaska* was to proceed east to a winter station on the south shore of Dolphin and Union strait; the *Mary Sachs* was to land supplies at the foot of Prince Albert sound with a view to exploration on Victoria island in 1914, and to devote the rest of the season to oceanographical work. This last was to be her chief work throughout, Mr. James Murray being the scientist allotted to her. At first, however, he sailed in the *Karluk* in order to divide the oceanographical equipment between himself and Dr. Mackay, oceanographer of the northern party. The southern party on the *Alaska* was in charge of Dr. R. M. Anderson, zoologist (Mr. Stefánsson's companion on his former expedition), and included various other scientists who were to do work in botany, oceanography, topography, geology, meteorology, and magnetism. The field of work of the topographers and geologist was to include the hitherto untraversed region as far as Great Bear lake, which appears to be intersected by rivers flowing in deep rocky gorges, but they were afterwards to proceed to the region of Prince Albert sound. Anthropological work would be done in the neighbourhood of Dolphin and Union strait, where the most westerly, and therefore the most isolated, tribe of Copper Eskimo is located. As regards the party on the *Karluk* the general plan was to devote the summers, as far as possible, to exploration of the unknown region, and the winter to sledge journeys over the ice. Although postponed for the time, these plans will still hold good for the future, so far as may be possible. Mr. Stefánsson is unable to account

for the imprisonment of the *Karluk* in the ice, but says that other vessels, whether earlier or later in the field than his own, were equally delayed. Besides Dr. Murray, four men of the southern party were unfortunately also aboard, the provisions intended for them being on the other vessels. From a study of the drift of other ships that have been abandoned off this coast, Mr. Stefánnson concludes that the *Karluk* would be comparatively safe from ice-pressure while at a distance from the shore, but will be liable to be crushed if driven towards the coast west of Point Barrow. If this should happen in winter, the crew should easily escape over the ice, and if in summer, they should also have a good chance, thanks to the three skin boats with which she is provided, each of which would carry the whole of the party and is far stronger than a whale boat. It is thought possible, however, that the ship may drift right across the polar basin. In the unexpected situation in which he found himself, Mr. Stefánsson proposed to spend the winter firstly in a survey of the Mackenzie delta—a work of some importance in view of the ultimate development of traffic on the river; and secondly in a sledge journey northward over the ice from Barter island—about 100 miles east of Mikkelsen and Leffingwell's route. No vessel appears to have been more than 50 miles from the shore in this longitude. This trip would be made in February and March. The main survey work would be done between March and July, partly by sledge, partly by boat. Should the *Karluk* not make her way to Herschel island, Mr. Stefánsson would use the *Mary Sachs* in her place. Later despatches, sent by Mr. Stefánsson from the Mackenzie delta in January and February, speak of his proposed northern sledge trip, and also of his intention of sending the *Alaska* to Coronation gulf, and taking the *Mary Sachs* to Banks island, *en route* for Prince Patrick island, during the present spring. The latter will be prepared to spend two winters in that region.

Captain Amundsen's Arctic Expedition.—According to reports from Kristiania during March, there appears to be a delay in the equipment of the *Fram* for her new voyage under Captain Amundsen, which may necessitate a postponement of the start beyond the date arranged. In this case the leader is said to intend devoting the time to practising the scientific staff and the aviators—three aeroplanes being included in the outfit. Dr. Filchner, leader of the recent German Antarctic expedition, has joined Captain Amundsen's staff as observer and photographer.

Government Support for Sir Ernest Shackleton.—It was announced during February that the Government is prepared to place on the estimates a sum of £10,000 in aid of the funds of Sir E. Shackleton's expedition, half to be given during the current year and the remainder a year later.

GENERAL.

Fire by Friction.—That fire may be produced spontaneously by the friction of dry branches under the action of strong winds has been stated by various travellers, and it has been natural to suppose that a knowledge of such occurrences may have guided primitive man to the artificial production of fire in a similar way. But the first precise description by an eye-witness of the actual occurrence of the phenomenon seems to be one sent to us by Mr. T. J. Eldridge, who himself frequently witnessed such spontaneous ignition of dry vegetation whilst engaged on a survey of Pratas shoal, some 150 miles to the southward of Hong-kong in the China sea. This island, consisting of sand fertilized by bird deposits, is covered with scrub some 15 to 20 feet in height. The constituent bush, of which Mr. Eldridge is unfortunately unable to give the name, has a trunk about a foot high giving out many branches which interlace with those of neighbouring bushes.

During the three months that Mr. Eldridge and his party were on the island, small fires, lasting only a few moments, were frequently seen to occur in the scrub, and it was at first thought that they were caused by the Chinese staff. They, however, denied that it was so, and maintained that the fires were caused by the spirit of the dead buried on the island. Many of the fires occurred at a considerable distance from any members of the party, and on one occasion Mr. Eldridge saw a bush burst into flames under circumstances which made him positive that the ignition was spontaneous. It was noticed that the fires only occurred in a strong breeze on dry days, and that the ignition appeared to take place in a collection of dry leaves formed in the crutch of the branches. The probability therefore appeared to be that the rubbing of the interlacing branches—many of them dead and absolutely dry—generated a spark which was communicated to the dry tinder. A remarkable fact was that, although a bush was seen to be in flames, the fire did not seem to last more than a few seconds; and that on subsequent examination of the bush, there was practically no evidence of burning. Mr. Eldridge suggests that this may throw light on the miraculous fire spoken of in the third chapter of Exodus. In commenting upon the above account, Mr. Henry Balfour (to whom it was referred) expresses regret that samples of the wood are not available, so that it might be proved by experiment whether it is a really good kind for producing fire by friction, as woods vary greatly in their suitability for the purpose. He suggests that the rubbing of the branches produces a fine friction dust which is caught by the leaves, forming a small pile in which the heat would accumulate until a spark is finally generated, the dry leaves then blazing up. He allows the possibility that frictional fire-making by a sawing process may have been suggested to man by this natural phenomenon, but it would hardly have suggested the far more widely distributed fire-drill. The process may, alternatively, have been suggested by some primitive manufacture which involved rubbing two pieces of wood together.

The Association of American Geographers held its tenth annual meeting at Princeton, N.J., on January 1 and 2 of this year. About 35 members were present, and the total attendance ranged from 25 to 60. The president for the year is Prof. A. P. Brigham, with Prof. I. Bowman as secretary. One of the most important items of business transacted was the adoption of the plan of co-operation proposed by the American Geographical Society. This provides for (1) a joint research committee of the two bodies to administer a joint research fund; (2) a joint meeting in New York each spring; (3) the publication of the Annals of the Association in collaboration with the American Geographical Society; (4) an interchange of publications between the two bodies. Altogether 28 papers were read, and an increasingly large proportion dealt this year with various phases of human geography. At the first meetings (1904–1906), physiographical papers predominated; then during the years 1907–1910, the two sides of the subject alternately took the lead; whilst at the last three meetings, anthropogeography has been ahead in each. This tendency will, it is thought, become still stronger in the future. The joint meeting will take place in New York on April 3 and 4, and the next annual meeting will be held at some point west of Pittsburgh.

Erratum.—March *Journal*, p. 313 (Discussion on Prof. Gregory's paper, "Is the Earth drying up?"). Prof. Gregory is professor of geology, not of geography, at Glasgow University.

OBITUARY.

Major G. E. H. Barrett-Hamilton.

It is with great regret that we learn of the untimely and sudden death from heart failure of Major G. E. H. Barrett-Hamilton, at the age of forty-three, on January 17 last, in South Georgia, while employed on an official mission to investigate the whale fishery in Southern seas. He had been despatched in October last by the Colonial Office and the British Museum of Natural History on this mission, to study and note the characters and habits of the whales, with a view to measures being taken to restrict the "fishery," which has been carried on in recent years with a success that threatens the extermination of the whales. A great friend and collaborator of the late Dr. E. A. Wilson, there is a melancholy interest attached to the fact that both met their fate in the Antarctic engaged in the pursuit of science. This was not the first mission of the kind that Barrett-Hamilton had been engaged on, since in the year 1896 Lord Salisbury appointed him to accompany Prof. D'Arcy Thompson on a mission to the Behring sea and the Pribiloff islands to investigate the life-history of the fur-bearing seals.

As a zoologist Barrett-Hamilton was best known for his monograph on British Mammals, a work which he lived to carry out so far that it will be an enduring memorial of him. He was a frequent contributor to the pages of the *Irish Naturalist*, and during the years 1895–1900 wrote on birds in the *Ibis*.

Major Barrett-Hamilton held a commission in the 5th Irish Rifles, and served with his regiment in South Africa during the Boer War (1901–02). He was educated at Harrow, where he was captain of the school football team in 1890, and at Trinity College, Cambridge. In 1903 he married Maud Charlotte, only daughter of F. S. Eland, Esq., of Ravenshill, Transvaal, who survives him, and by whom he leaves six children. Barrett-Hamilton was an accomplished naturalist, and his genial and kindly nature endeared him to all who knew him. His death, in the prime of life, will be greatly mourned by a wide circle of friends, and by no one more than by his fellow-workers in the Natural History Museum, where much of his interest in life lay, in so far as his scientific work was concerned.

C. E. F.

Admiral A. A. C. Parr.

We regret to record the death, which occurred at Folkestone on February 26, of Admiral Alfred A. C. Parr, one of the officers in the British Arctic Expedition of 1876–77 under Sir George Nares. Entering the navy in 1863, Parr served in the Mediterranean, in South America, and elsewhere, becoming lieutenant in June, 1870, and receiving the Beaufort Testimonial as having passed the best examination in his year. In the expedition of 1875–76, Parr formed one of the northern party under Commander (now Admiral Sir Albert H.) Markham, which gained the distinction of reaching the highest latitude till then attained by man. During the return journey the party was attacked by scurvy, and became so greatly enfeebled that when still 30 miles from the *Alert*, it became exceedingly doubtful whether their strength would last out so as to enable them to cover the remaining distance. In these circumstances, Lieut. Parr made the gallant offer to walk on ahead to secure help, and, as described by Sir G. Nares, in his 'Voyage to the Polar Sea,' started alone with only an alpenstock and a

small allowance of provisions. With dogged determination he held on, stopping once only to make himself a cup of tea, and completed the long and solitary walk within twenty-four hours. He arrived at the ship thoroughly exhausted, but relief was at once despatched, and, as has been testified in a letter to the press by Admiral May (then a lieutenant in the same expedition, and the officer chosen to lead the advance of the relief party) was undoubtedly the means of saving the lives of the northern party, with the exception of one seaman who had already succumbed. Parr afterwards commanded the *Inconstant* in the Egyptian war of 1882, becoming captain in 1887, rear-admiral in 1901, and vice-admiral in 1905. Retiring the year after, he was promoted to admiral in 1908. In his latter years he suffered from serious heart affections, the seeds of which may, it is thought, have been sown by his heroic exertions above referred to. He was only in his 65th year.

CORRESPONDENCE.

On the Desiccation of Eurasia and some General Aspects of Desiccation.

EVERY geographer will surely be thankful to Prof. Gregory for having brought together much valuable information relative to the desiccation of various parts of the Earth, and thus renewed interest in this matter. If he gives us no hints as to the relative value of his data, the copious bibliography appended to his paper will facilitate the study of the subject to those who will intend to go deeper into it.

I certainly will not attempt to discuss the value of Prof. Gregory's authorities, taken so wide apart as the Genesis on the one side and modern geological and archæological research on the other side. So I shall limit my remarks to the observations made by Prof. Gregory concerning my own contribution to this subject, "The Desiccation of Eurasia," published in the *Geographical Journal* for June, 1904.

First of all, I did not speak of "the desiccation of the world." Not even about the desiccation of *our earthball*. I limited my remarks to the desiccation of *Eurasia*, which I consider as a consequence of the Quaternary Glacial period. And by Eurasia I understand—not the continent that existed in Silurian, or Carboniferous, or Jurassic times, but the continent that had acquired approximately its present size and shape since the end of the Tertiary period.

My contention about this continent, as Prof. Gregory correctly words it, is that *the climate of Eurasia is undergoing since the end of the Glacial period "a steady progress towards drought, though there may be fluctuations in the advance."* And, having read now Prof. Gregory's paper, I must say that *if it accentuates the local fluctuations*, it does not contradict my statement; it further confirms it.

It confirms it by direct evidence as regards prehistoric times. As to desiccation in *historical times*, the data brought together by Prof. Gregory concerning Palestine, Egypt, Cyrenaica, Tunis, and Greece cannot be properly interpreted unless we analyze, as physical geographers, some general aspects of desiccation; and this I beg leave to do at some length.

Let us state first, with some precision, the main points of the case. The desiccation I speak of is *not* due to a diminishing rainfall. It is due to the thawing and disappearance of that immense stock of frozen water which had accumulated on the surface of our Eurasian continent during the tens of thousand years that

the Glacial period had been lasting. Diminishing rainfall (where such a diminution took place) is thus *a consequence, not a cause of that desiccation.*

The extension of the ice-sheet in Eurasia is pretty well known. The whole of Northern Europe, nearly down to the 50th degree of latitude, was buried at a certain time under an ice-cap, probably more than 1000 feet thick; while the Pyrenees, the Alps, the Caucasus, and very probably the Carpathians and the Balkans, were also buried under immense masses of ice. As to Asia, it may be taken as proved that not only the border-ridges of the two great plateaux of Asia (the Atlai, the Sayan, etc., on the northern border, the Himalayans, the Khingan, the Tian Shan, etc.), but also large portions of the plateaux themselves were covered during the Great Ice Age with immense ice-caps.*

Whatever the causes, atmospherical or cosmical, of such a glaciation may have been, the fact is there; the Earth *has* gone through a period during which over immense portions of the northern hemisphere (possibly also the southern) *the amount of snow received every year from the atmosphere was in excess of the amount of water that was lost during the year by the same surfaces, either by evaporation or by the rivers carrying it to the sea.*

But the appearance and the slow growth of such an ice-cap, until it had covered from 40 to 50 degrees of latitude, was *the building up by Nature of a gigantic ice-cellar*, and this ice-cellar represented an enormous quantity of water withdrawn from the atmosphere *and stored up for future use;* while its subsequent thawing represented a *restitution of that water to the atmospheric circulation.* The gradual exhaustion of that store of water, both evaporated and carried away by rivers from the ice-cap and the glaciers first, then from the lakes to which they gave origin, and finally from the marshes and the *urmans* originating out of the lakes, is what I mean when I speak of the desiccation of the Eurasian continent.

Now, it is self-evident that physical changes of such a magnitude could not have taken place without a series of oscillations and partial reversals. Whichever natural evolution we represent by an ascending or a descending curve, the curve will never be smooth; it will have its undulations. Besides, the gradual melting of these immense masses of ice evidently gave origin to quite a variety of subordinate phenomena. All sorts of new deposits, aerial and aqueous, were accumulated around the fringe of the main mass of the thawing ice-sheet; on the plateaux immense lakes appeared (like the Lake Agassiz of North America), and later on they were broken into myriads of smaller lakes. The old channels of the pre-glacial rivers having been choked by the sub-glacial deposits, new rivers had to dig out new channels in order to find their way to the sea, and so on. *All sorts of landscapes were thus appearing on the territory evacuated by the ice.*

Let us take the Greenland ice-cap. Even now, on the periphery of this relatively small mass of ice, we see how—evidently in consequence of an unequal accumulation of snow over different portions of the ice-cap in different years—the "flowing" of this plastic mass of ice and its discharge through the main valleys differ in different series of years. The result of these changes of pressure is that

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* The earlier explorers of Asia who never had studied glacial formations in Europe, denied such an extension of glaciation. Those geologists, on the contrary, who had studied the effects of glaciation in Europe or in the United States easily found in Asia traces of a glaciation as extensive as that of North America. For the sense of the orographical expressions just used see my "Orography of Asia," with maps, in *Geographical Journal*, vol. **23** (1904), pp. 176, 331; the article "Asia" in *Chambers' Encyclopædia;* and the articles on Turkestan, Siberia, Russian Empire, etc., in the 9th and 10th editions of the *Encyclopædia Britannica*.

rocks in the sea-coast region, which for centuries had been buried under the ice, are occasionally freed from it; and immediately the by no means poor vegetation which grows on the seashore in close vicinity with the ice-walls invades them and thrives there for a number of years. Then, again, for the same causes, the discharge of ice through this or that valley is increased, and the moving ice covers with its bottom-moraine, or carries away, the rest of the plants that had invaded the rocks. *In this way inter-glacial deposits of plants are formed even now, under our very eyes.*

Specialist geologist-geographers, like Prof. Penck and several others, have distinguished, it is known, several phases of a more or less extended glaciation in the Alps, and they have subdivided the Quaternary Ice Age in Europe into at least three periods, differing from each other by the extension and thickness of the ice. But they do not mean, so far as I remember (being far from all scientific libraries, I can only speak from memory), that the glaciation of Middle Europe should have come twice to an end, in order to give origin to a sub-arctic vegetation.

Another point of importance is the extreme variety of physiographical features offered by a continent which recovers from the effects of a wide glaciation. Here it is that the collaboration of the geologist and the physical geographer is especially needed. The geologist, when he finds buried in his Post-Glacial records the remainders of a *tundra* vegetation, or of a Steppe flora and fauna, is apt to consider them as traces of different Tundra and Steppe periods, or periods of drought. But the physiographer knows that in a continent which is drying up he finds *side by side* the tundras, the endless marshes, and the steppes, appearing as *contemporary landscapes.* The present steppes of South Russia come quite near to the twenty-million-acres-wide marshes of the Pripyat and Berezina region; and if one crosses West Russia from Finland or the Novgorod lake district to Odessa, he finds in close succession all the following phases of desiccation: a lake district, the wooded plateaux, the immense marshy region of the Polyesie, the black-earth Steppe region, the Loess Steppes, and the dry sun-burnt lands of Bessarabia on the Black sea coast. In Siberia, the terrible marshy woods—the *urmans* of the Ob basin—are close by the dry prairies of Baraba (both in way of desiccation)—the latter, by the way, are an exact counterpart of the prairies of Winnipeg,* which also merge further north into the barren lands, or *tundras*, of Canada. In Transbaikalia we can even see the marshy surface of the Vitim plateau merging gradually into the wide dry valley of the Uda, the gravelly bottom of which represents a dry steppe inhabited by nomad Buryates—as one may see it now along the Trans-Siberian railway between Lake Baikal and Tchita; and so on.

In all these cases the differences of physical aspect are *not in time;* all these forms are contemporary. *They are not either in degrees of latitude or longitude; they are in altitudes and in drainage.* All are in a stage of desiccation, but they represent different phases of it. Consequently there is not the slightest reason for seeing in a similar variety of physiographical characters discovered in Post-Glacial deposits a proof against a steadily progressive desiccation, or a proof of recurrent dry and wet periods. These deposits may be products of the very same period.

The same applies to the Loess deposits. They are not proofs of a special dry period; they are a necessary local product of Post-Glacial desiccation. The fauna and flora of the Loess-covered regions certainly are now characteristic of moderately dry spaces. But the Loess deposits have also another specific

* See my article on 'Canada,' in *Nineteenth Century*, 1898.

character. Everywhere they fringe the regions covered with the bottom moraines of the ice-caps, or they appear in the large valleys intersecting such regions (the Rhine, the Lena, etc.). Their double origin—æolic in the upper layers and often aqueous in the lower ones—can be taken as proved; and everywhere they are constituted of what is well known to the glacialists as the fine mud, thoroughly mixed in the bottom moraines with the rougher particles of sand and gravel, and carried away out of it either by wind or by rains. Over immense spaces of the East Asian plateaux this mud has been blown out of their surface deposits, or it was carried (on the outskirts) by the surface waters over the grass-covered slopes.

Beginning as deposits in wet prairies and marshes, the Loess soon must have taken, as it grew in thickness, and owing to its great permeability, the dry character it has now in China on the borders of the lower terrace of the high plateau, or in the black-earth regions of South Russia, on the Rhine, and so on. But it certainly is no indication of a dry *period*. This would be a too far-fetching generalization. Thus, for instance, I found on the Lena deposits of typical Loess, containing rests of the extinct rhinoceros (*R. tichorhinus*), together with teeth of small rodents, close by the immense lower red sandstone plateau, covered with marshes. We have here nothing but *two phases of the same portion of the desiccation period*, not two distinct climatic periods.*

This brings us to another important physico-geographical fact—a law, I may say—which can be formulated as follows: *In regions that are desiccating after the thawing of the ice-cap, desiccation in its later phases progresses relatively more rapidly on the higher level plateaux than in the lowlands near the sea-coast. It is retarded in the latter by the water supplied from the higher levels.*†

The following will better explain what I mean. When I explored, in 1871, the Glacial and Post-Glacial deposits of Finland, and slowly moved from south to north, always measuring the altitudes at which I found lacustrine deposits above the levels of the present lakes, I was astonished to find that these altitudes were greater around the lakes of the Kuopio swelling than they had been found to be around the lower lakes of the Saima system. The desiccation of the higher lakes had thus progressed farther than the desiccation of the lower lakes.

An explanation of this fact was given to me, also in Finland, when I studied how the waters of Lake Höytiänen suddenly found an outflow into a lower-lying lake, digging their channel, in about a week's time, in a thickness of lacustrine deposits between the two lakes. The level of the upper lake was suddenly lowered then by several feet, and its surface reduced. *The water stored up in the higher-level reservoir went to feed the lower reservoir, and to maintain the dampness of the lower terrace.*

What happened here as a catastrophe is going on, however, in a continuous way all over the world, wherever lakes have an outflow to the sea. The channel of this outflow being steadily deepened, the upper lakes decrease in size, and their water goes to maintain a certain degree of moisture in the coast region. *The desiccation of the higher-lying plateaux profits to the lowlands of the coast region.* However, one remark must be made. This law applies only to the later phases of desiccation, when the stores of ice, and later on of water, in the upper lakes

* It is interesting to note that I saw small pits of typical loess formed now in Central Russia, in a river-valley at the foot of a slope covered with boulder clay. I described this feature in a paper on the geology of the district of Meschovsk, in the *Bulletin de la Société des Naturalistes de Moscou* in 1869.

† In the discussion on my paper, in 1904, H. R. Mill had already indicated the possibility of it.

and marshes begin to be exhausted. Where these stores are yet very large, as we see it on the plateaux of the far north, where water remains frozen for the greater part of the year, the process may be in pl[illegible] the reverse. A valley may be dry, while the high plateaux are still ice-bou[illegible] (Norwegian *fjälds*), or covered with marshes (Vitim plateau, with the valley [illegible] the Uda).

This phenomenon—if it be general, as I suppose it [illegible]s—fully explains the facts of an absence of notable desiccation in the lowlands surrounding the Mediterranean during the historical period, which Prof. Gregory considers as contradicting the desiccation of Eurasia during the same time. What is, in fact, the meaning of the facts he has mustered? Palestine—he writes—is a test case; and in his test case he shows that *in prehistoric times Palestine was much better provided with water than it is now;* but little change has taken place in its climate during *the historical times.* It is known, indeed, that during the early Post-Glacial period the Dead sea reached a level 250 feet above its present level. And "there is no doubt"—Prof. Gregory writes—"that, in times geologically recent, the climate of Palestine was moister than it is now; but this period was long prehistoric." He accepts, moreover, the views of Prof. Blanckenhorn, who speaks of three great "Pluvial" periods in Palestine, of which the latest "began 50,000 B.C., lasted to 10,000 years B.C.," and was contemporary with the last Glacial period of the Alps.

Without endorsing Dr. Blanckenhorn's classification so long as the so-called "Diluvial" deposits of the Lebanon highlands have not been explored more thoroughly,* we may thus accept Prof. Gregory's statement to the effect that up to a time which may be placed, roughly speaking, some 12,000 years ago, Palestine, like the rest of Eurasia, lived through periods of considerable wetness (an inland sea reaching the Lake of Galilee, and "Pluvial" periods); but for the last 10,000 or 12,000 years it had already acquired a climate approaching, and finally similar, to the one it has now.

Going now over to other countries, and namely to Egypt, Prof. Gregory mentions the opinions of different explorers who maintain that no change of climate took place in the lower parts of the valley of the Nile during historical times—that is, during the last 8000 years. This is more than probable, and was known long since. But of the changes that may, or may not, have taken place in the highlands of the upper Nile we learn nothing.

Same for Cyrenaica, which Prof. Gregory has explored himself. "There is not," he writes, "the slightest physiographic evidence of any considerable change in the rainfall or water supply of Cyrenaica since the days of the Greek civilization in the seventh century B.C." No change, then, for the last 2700 years in the coast region.

Same, again, for Tunis, according to Dr. Partsch: no desiccation since Roman times. Same for the Sahara: Schirmer denies an increased desiccation of the desert in historical times.

And finally, taking Greece, Prof. Gregory writes: "That Greece, like other Mediterranean countries, had a wetter climate during the glaciation of north-western Europe † is indicated by various facts. But through the historical times the climate of Greece seems to have not been altered to a serious extent."

These are the facts in which Prof. Gregory sees a contradiction to the desic-

* It is known that for a long time geologists described the Glacial deposits as "Diluvial" and attributed them to a "Pluvial" period.

† Why "North-Western Europe" only, when the glaciation of North and Central Germany and Central Russia is recognized by the respective geological surveys?

cation of Eurasia *in historical times*. But all these facts are *relative to the lowlands around the coasts of the Mediterranean*, and if Prof. Gregory will examine *how* the desiccation of a continent is going on, he will certainly himself see that the stationary conditions in the lowlands give not the slightest idea about what was going on at the same time on the plateaux and the highlands, and on the continent altogether. To the geographer and the biologist, the fact that the climate of Egypt has changed but little during the historic times was known long since. I remember even how, nearly half a century ago, in the heat of the discussions raised by Darwin's theory of evolution, the favourite argument of the anti-Darwinians was, that the flora and fauna of Egypt have remained unchanged for the last five thousand years; to which Darwin had already replied that the reason of it was that "*in Egypt, during the last several thousand years, the conditions of life, as far as we know, have remained absolutely uniform.*" *

At the same time we know perfectly well that the climatic conditions have *not* remained uniform on the plateaux of Central Asia, nor in northern Europe and Asia. The gradual upheaval of northern Europe, including northern and north-eastern European Russia (Petchora region), has been going on lately at a rate of about 3 feet per century, and the consequence of it was, of course, the deepening of the river channels, the drying up of the marshes of the Novgorod lake-district of Russia, and the steady diminution of the lakes of Finland. Desiccation was thus going on. The same upheaval having taken place along the Siberian coasts of the Arctic ocean, it has had the same consequence in the drying up of the lakes in the Baraba steppes. It is easy to say that such a desiccation *must* be a temporary desiccation, which *will* be compensated; but not the slightest proof of a reverse process, beyond small temporary fluctuations, has yet been produced to my knowledge, and I find none in Prof. Gregory's paper. Thus, albeit small temporary fluctuations in the lakes of the Chany system,† we have not yet heard that the villages that were built along the shores of Lake Chany, or on the former bottoms of the Lakes Abyshkan and Moloki, *desiccated since the beginning of the nineteenth century*, should have been re-invaded by water. Fluctuations took place, but they are mere ripples on a steady desiccation curve.

As to the Caspian, I know, of course, Prof. Brückner's work on the probable oscillations of its level, and have written about it. But, with all the respect due to every careful empiric investigation, we must not forget how difficult it is to determine the changes of level of an interior sea in times past, when no level observations were made—especially so when we know that local subsidences of its shores have been taking place.‡

Reliable level observations began to be made on the Caspian *only in the nineteenth century*. But even if we allowed that the three figures of Prof. Brückner for the tenth, twelfth, and fourteenth centuries also are correct, they would only prove that, with *one striking exception in the twelfth century* (unexplained

* 'The Origin of Species,' p. 169 of the 6th edition (beginning of Ch. VII.).

† See my first paper in *Geographical Journal*, June, 1904, p. 723.

‡ In 1862 I saw a very instructive case of this sort in the delta of the Selenga, at its entrance into Lake Baikal, when quite a considerable inhabited area sank under the waters of the lake during an earthquake. Remainders of houses, now *below* the level of the lake, can easily be taken later on for a proof of a raise of the level of the lake in the year 1862; but there was nothing of the kind: there was only the subsidence of the delta-region. (I gave an account, in French, of this interesting earthquake, probably due to the sinking in the delta of the Selenga, in Prof. Palmieri's *Bulletin* of the Naples Seismological Observatory fo 1863 or 1864.)

by Prof. Gregory, and about which I can say nothing, having not the necessary books in this little Italian town), *the sinking of the level of the Caspian has been going on during the last thousand years.* In fact, what is described by Prof. Gregory as "the normal level" of the Caspian is nothing but the level taken by the topographers as a zero, when the first level observations were begun. This zero was found, in 1840, to be 84 feet below the level of the Black sea, and 89 feet in 1860–1870, by the Caucasus triangulation; 86 feet being the figure now accepted. As to the temporary and periodical fluctuations, since 1840, due to winds and rainfall, they do not exceed 3½ feet. Consequently, Brückner's figures reduced to the level of the ocean, would be as follows:—

A.D. 915–921	57	feet *below* the level of the ocean.
12th century	100	
1306–7	49	
Five centuries later:—		
1815	79	
1843–6	88	
1847	85	
1856–60	87	
1876–8	84	

Apart from the single twelfth-century exception (attributed by Woeikoff to exceptional conditions on the plateau, which are *possible*, but still purely hypothetical), we have thus a *pretty regularly accelerated sinking* from −57 to −86 in the last ten centuries. The cyclical fluctuations in the nineteenth century are quite insignificant.

As to the Aral-Caspian basin—so far as I remember Prof. Lenz's paper on the Amu and the Caspian, published some forty-five years ago (it so happened that I was editing the respective volume of the Russian Geographical Society's *Zapiski*), it was a serious study, based on Arabian sources; but I have not here, in this little Italian town, Woeikoff's paper.* At any rate, I prefer to base my conclusions on the geology of the Aral-Caspian region (see the map I gave in my paper in this *Journal*, June, 1904). According to these researches, the Amu never reached the present reduced Caspian. The channel by which Lake Aral was supposed to have once discharged its waters into the Caspian—the Uz Coi—contains no traces of a fluvial bed, but it contains, on the contrary, the same shells which now inhabit the Caspian. It was, then, the Caspian which reached in olden times Lake Aral and received the Amu—great temporary fluctuations taking place in this basin in its steady desiccation. I think that if Prof. Gregory studied this special question, he probably would come to the same conclusion. Mere quotations of divergent opinions prove nothing; they merely create confusion—especially so when the writer leaves entirely to the reader to find out the relative reliability of the different opinions, and even does not give these opinions with sufficient fulness.

The same remark is to be made concerning the Lob-nor basin. With all respect for Sven Hedin's work when he describes the important *facts* he has observed, I cannot follow him in all his physico-geographical *conclusions*; and the reasons for such an attitude, which I take in common with several other explorers of the region, I have explained in the pages of the *Geographical Journal*.

Leaving aside many small remarks, I conclude, therefore, as follows: That the desiccation of Eurasia has been going on during the Post-Glacial period (helped

* Let me express here my best thanks to Mr. C. Bicknell, in whose library I found some of the books I needed, and who has so courteously placed them at my disposal.

by the upheaval of the northern parts of this continent and the consequent retreat of the Post-Glacial ocean); that it has continued in historical times, with a number of *local* oscillations, which were necessary consequences of the general desiccation; *and that it is not yet accomplished*—there is no use to contest. This desiccation was, and still is, a very complicated process offering an immense variety of aspects, while the temporary and local fluctuations in this process have necessarily been and are many; but the general desiccation process continues still.

Let us hope, then, that Prof. Gregory will continue his studies of this subject; and that now, after having made the beginning of a symposium of opinions, he and his students will undertake some serious work of exploration of their own. A work that is most desirable and necessary, would be a mapping of all the Post-Glacial lakes and an exploration of their deposits all over Europe and Asia—beginning, let us say, with this country. Such a work would surely yield a solid basis for profitable discussions about desiccation.

P. KROPOTKIN.

Bordighera,
February, 1914.

Prince Kropotkin's interesting restatement of his views on the desiccation problem shows that he does not now hold that there has been a climatic change in the Mediterranean coast lands during historic times. Those countries give the most important evidence because of their written records; but as I pointed out in my paper, Hungary, as a representative of central Europe, the central Sahara, and central Asia, also furnish evidence that their climates have not become appreciably drier in the historic period. Prince Kropotkin's note appears, moreover, to abandon the main evidence in favour of desiccation; for, as he points out, since dry and wet deposits are both being laid down at the present day, the existence of dry deposits does not prove a dry period. Similarly, the existence of deposits laid down under wet conditions does not prove a wet period.

Again, as Prince Kropotkin explains the oscillations of level of the Caspian by earth movements, will he not apply the same explanation to the once greater size of the Dead sea, and thus remove the most striking evidence for the "pluvial period" in Palestine? Prince Kropotkin is no doubt quite correct that northern Eurasia had a moister climate during the passing of the Glacial conditions; but Eurasia appears to have passed so quickly through that stage that, as Dr. Sven Hedin, Dr. Berg, and others assure us, the Post-Glacial desiccation had reached its present stage before the beginning of historic times.

J. W. GREGORY.

On December 4, 1913, I sent you a paper on "Desiccation." When acknowledging my communication you informed me that Prof. J. W. Gregory was dealing with that very question on the Monday following. In later correspondence you were kind enough to forward me a proof of the Professor's paper, and you stated that I would probably agree with you after reading the proof that the subject had been dealt with sufficiently for the present, but you offered me space in the correspondence column for a letter stating briefly any points I desired to bring out. Taking advantage of that offer, I now indicate—

(1) Prof. Gregory's paper was an examination of the question whether the Earth as a whole was drying up. My paper assumed that desiccation *was* proceeding in the centre of great continents, especially in Central Eurasia, and stated the *cause*. On this head I submit that careful examination of Prof. Gregory's paper

will induce the belief that the Professor himself practically admits that, though there is no sufficient proof that the Earth as a whole is drying up, the centres of great continents may be getting drier as an equivalent to greater precipitation elsewhere.

(2) The following is a *précis* of the basis of my paper: "The discharge from a lake having an outlet deepens the outlet, while deposits from the area draining into the lake raise its bed, and thus the lake is converted into a swamp with sluggish rivers draining through it." Prof. Gregory stated the same thing in other words, but he did not follow up the point, which I did thus: "As the outlet continues to deepen, the rivers in the swamp lower their beds and denude their banks till the site of the former lake becomes a rolling plain off which water flows away more or less freely. Analogous to this is the case where a sea bottom is raised above sea-level with so little disturbance that it forms a nearly level plain. With even moderate rainfall such plain tends to be marshy, and if a river drains it the marsh will be denuded precisely as in the case of a lake marsh." Then I added: "Both processes have been proceeding in great degree in Central Eurasia, for the numerous lakes which existed in Neolithic times have nearly all been drained off, while the immense Obi marsh of Western Siberia, which covers about 280,000 square miles, has been steadily undergoing denudation."

(3) Owing to the above-mentioned denudation the evaporation in Central Eurasia is much less than it was, and, as a proportion of the lost evaporation was precipitated within its own area, the precipitation is also less than formerly. This reduction in precipitation is the main factor in the observed desiccation.

The rest of my article was devoted to a mathematical treatment of my theory, and to a suggestion for palliating the desiccation by engineering work.

I have, etc.,

EDMOND COTTER,
Colonel, late Royal Engineers.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1913–1914.

Ninth Meeting, February 23, 1914.—The Right Hon. EARL CURZON OF KEDLESTON, G.C.S.I., G.C.I.E., etc., President, in the Chair.

ELECTIONS.—*David Taylor Arnott; Rev. Cyril C. B. Bardsley; C. C. Roslington Boyer; Captain H. Brassey (Royal Horse Guards); Captain Edward Bellasis Cardew, R.E.; Miss A. Murray Campbell Davidson; Frank Debenham; Hon. Walter Fremantle; Gerald Graham-Clarke; Henry Malcolm Hubbard; Miss Mary Meinertzhagen; Rev. Frederick Charles Meredith; William Charles Meyerstein; Harold James Pullein-Thompson; Hon. N. Charles Rothschild; Miss Winifred H. Tweedie; Miss Antonia Williams.*

The paper read was:—

"The Sea Route to Siberia." By Dr. Fridtjof Nansen, G.C.V.O., and Jonas Lied.

Tenth Meeting, March 9, 1914.—Major LEONARD DARWIN, Vice-President, in the Chair.

ELECTIONS.—*Henry D. Boddington, D.Sc.; Cyril Campbell; S. H. Christy, D.S.O.; George Raymund Crowther; Major-General Henry William Duperier (late R.E.); Sherbourne Eardley-Wilmot; Walter William Gibbs; Malcolm Vivian Hay; Lieut. P. Gauntlett Huddleston; Miss Helen E. Ionides; Henry*

Gilbey Riviere; Lieut. Jermyn Rushbrooke, R.N.; Miss Minnie Vinter; Captain J. C. Voss; Mrs. Weston; Guy E. H. Wilson; Captain Cecil Harry Wolff (4th Batt. Bedfordshire Regt.).

The paper read was:—

"The Nigeria Kamerun Boundary Commission of 1912–13. By Captain W. V. Nugent, R.A.

Afternoon Meeting, March 19, 1914.—Colonel Sir THOMAS HOLDICH, K.C.M.G., K.C.I.E., Vice-President, in the Chair.

The paper read was:—

"A Geographical Study of Portuguese East Africa, South of the Zambezi." By E. O. Thiele.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are as a rule written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
Jber. = Jahresbericht.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society; Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is $10 \times 6\frac{1}{2}$.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Adriatic. **Grund.**

M. k.k. G. Ges. Wien **55** (1912): 503–511; **56** (1913): 164–176, 471–487.

Die fünfte Terminfahrt S.M.S. *Najade* in der Hochsee der Adria vom 16. Februar bis 11. Marz 1912. Von Prof. Dr. Alfred Grund.

Die 7. und 8. Terminfahrten S.M.S. *Najade* in der Hochsee der Adria, 1912–1913. By the same. *Illustrations and Diagrams.*

Adriatic. *Rev. Hydrobiologie, etc.* **5** (1913): 551–570. **Steuer.**

Einige Ergebnisse der 7. Terminfahrt S.M.S. *Najade* im Sommer 1912 in der Adria. Von Prof. Dr. Adolf Steuer. *Sketch-map and Diagram.*

Adriatic—Tides. *Ann. Hydrographie* **41** (1913): 77–86. **Dannies.**

Die Gezeiten von Ragusa, St. Andrea, und Pelagosa. Ein Beitrag zur Kenntnis der Gezeiten der Adria. Von Dr. Hermann Dannies. *Diagrams.*

Albania. *Deuts. Rundschau G.* **36** (1913–14): 36–40. **Lukas.**

Zur Landeskunde Albaniens. Von Dr. Georg A. Lukas.

Alps—Finsteraarhorn. *Alpine J.* **27** (1913): 263–300. **Farrar.**
The first ascent of the Finsteraarhorn: a re-examination. By J. P. Farrar. *Portrait and Illustrations.*

Alps—Glaciation. *Z. Gletscherkunde* **7** (1913): 225–259. **Klebelsberg.**
Glazialgeologische Notizen vom bayrischen Alpenrande. Von Dr. R. v. Klebelsberg. I. und II. *Sketch-maps.*

Alps—Glaciers. *Z. Gletscherkunde* **7** (1913): 265–275. **Klebelsberg.**
Gletschermessungen und Gletscherbeobachtungen in den Oetztaler Alpen und in der Kiesenferner Gruppe im Jahre 1912. Von Dr. R. v. Klebelsberg. *Sketch-map.*

Alps—Mont Blanc. *G.Z.* **19** (1913): 319–335, 382–395. **Lucerna.**
Die Flächengliederung der Montblancgruppe. Von Roman Lucerna. *Sketch-maps and Illustrations.*

Alps—Morphological history. *Z. Ges. E. Berlin*, 1913: 610–624. **Lautensach.**
Ueber den heutigen Stand unserer Kenntnis vom präglazialen Aussehen der Alpen. Von Dr. Hermann Lautensach.

Alps—Morphology. **Kilian and Reboul.**
Geol. Charakterbilder (*Stille*), Heft 15 (2) (1913): 8 *Plates, with text.*
Morphologie des Alpes françaises. Par W. Kilian et P. Reboul. 2e fascicule. Massifs crystallins de la zone delphino-savoisienne. *Illustrations.*

Alps—Phytogeography. **Braun.**
Die Vegetationsverhältnisse der Schneestufe in den Rätisch-Lepontischen Alpen. Ein Bild des Pflanzenlebens an seinen äussersten Grenzen. Von Josias Braun. Basel: Georg et$_4$Cie., 1913. Size 12 × 9½, pp. vii. and 347. *Map and Illustrations. Price Mk.*20.

Austria—Danube—Ada-Kaleh. *Petermanns M.* **59** (1913): II. 54–55. **Wichmann.**
Die Annexion von Ada-Kaleh durch Oesterreich-Ungarn. Von Hugo Wichmann. *Sketch-map.*
Ada-Kaleh is an island in the Danube, the ownership of which was not provided for in the Berlin Treaty. In recent years it has been occupied by Austria-Hungary (though nominally a Turkish possession), and was formally annexed last year.

Austria—Bohemia. *Deuts. Rundschau G.* **36** (1913–14): 70–74. **Kaiser.**
Der Kammerbühl bei Eger. Von. Prof. E. Kaiser. *Illustrations and Section.*

Austria—Bohemia. *Z. Ges. E. Berlin*, 1913: 35–44. **Rassmuss.**
Zur Morphologie des nordwestlichen Böhmen. Von Dr. H. Rassmuss.

Austria—Bosnia and Herzegovina. **Sieger.**
Weltverkehr u. Weltwirtschaft **3** (1913): 121–127.
Das bosnisch-herzegovinische Bahnproblem. Von Prof. Dr. Robert Sieger.

Austria—Dalmatia—Phytogeography. **Adamović.**
Vegetationsbilder (*Karsten & Schenck*) **10** (1912): *Plates* 37–48.
Vegetationsbilder aus Dalmatien. II. Von L. Adamović. *Illustrations.*

Austria—Galicia—Rivers. *M. k.k. G. Ges. Wien* **55** (1912): 552–562. **Pawlowski.**
Die Eisverhaltnisse der oberen Weichsel, des oberen Dnjestr und ihrer Nebenflusse. Von Dr. St. Pawlowski.

Austria—Styria. **Schlosser.**
Deuts. Rundschau G. **35** (1912–13): 454–466, 516–522, 547–553.
Beiträge zur historischen Geographie des Bacherngebirges in Südsteiermark. Von P. Schlosser. *Map and Illustrations.*

Austria—Vienna. *Deuts. Rundschau G.* **35** (1912–13): 571–576. **Wallner.**
Der Boden der inneren Stadt Wien vor seiner Besiedlung. Von A. Wallner. *Map.*

Balkans—Railways. *Weltverkehr u. Weltwirtschaft* **3** (1913): 81–84. **Grothe.**
Die neuen Verkehrsprobleme auf der westlichen Balkanhalbinsel. Von Dr. Hugo Grothe. *Sketch-map.*

Baltic—Historical. *Z. Ges. E. Berlin*, 1912: 766–778. **Reuter.**
Der Ostseehandel in früheren Zeiten. Von Christian Reuter.

Baltic—Hydrography. *Z. Ges. E. Berlin*, 1912: 738–754. **Spethmann.**
Der Wasserhaushalt der Ostsee. Von Hans Spethmann.

Baltic—Hydrography. *Z. Ges. E. Berlin*, 1912: 721–738. **Witting.**
Die Hydrographie der Ostsee. Versuch einer Zusammenfassung. Von Rolf Witting.

Baltic—Towns. *Z. Ges. E. Berlin*, 1912: 754–766. **De Geer.**
Die Grossstädte an der Ostsee. Von Sten De Geer. *Sketch-map.*

Baltic Countries—Trade. *Z. Ges. E. Berlin*, 1912: 778–789. **Braun.**
Bemerkungen über die Verkehrsgeographie im allgemeinen und die der Ostsee im besonderen. Von Gustav Braun.

Black Sea. *Ann. Hydrographie* 41 (1913): 86–91. **Reinecke.**
Eis und Schiffahrt der fünf Winter von 1907–8 bis 1911–12 in den Häfen des Schwarzen Meeres. Von Kapt. G. Reinecke.

Denmark—Færoes. **Rudolphi.**
Deuts. Rundschau G. 35 (1912–13): 400–418, 500–516, 554–571.
Wanderungen auf den Färöer. Von Dr. Hans Rudolphi. *Map and Illustrations.*

Europe—Travel. **Johnston.**
Travel films, being pen pictures of Europe. By Hugh Johnston. London: C. H. Kelly, 1914. Size $8\frac{1}{2} \times 5\frac{1}{2}$, pp. vii. and 167. *Illustrations. Price 3s. 6d. net. Presented by the Publishers.*

Europe—Climate. **Kerner von Marilaun.**
Sitzb. k. A.W. Wien, Abt. IIa. 122 (1913): 233–298.
Synthese der morphogenen Winterklimate Europas zur Tertiärzeit. Von Dr. Fritz Kerner v. Marilaun. *Sketch-maps.*

Europe—Waterways. *Deuts. Rundschau G.* 36 (1913–14): 55–58. **Dix.**
Mitteleuropäische Ausnahmzustände. Von Arthur Dix.
Discusses the economic effect of the partition of navigable waterways between different States.

Finland. *Deuts. Rundschau G.* 36 (1913–14): 58–64. **Hildén.**
Pyhätunturi. Einige Charakterzüge eines finnischen Fjeldes. Von Kaarlo Hildén. *Illustrations.*

France—Alps—Geodesy. *C.R.A. Sc. Paris* 157 (1913): 764–767. **Helbronner.**
Sur les triangulations géodésiques complémentaires des hautes régions des Alpes françaises (onzième campagne). Par P. Helbronner. *Sketch-map.*

France—Hérault. *B.S. Languedoc. G.* 36 (1913): 1–19. **Bissane.**
Monographie des Matelles. Par M. Bissane. *Sketch-map and Illustrations.*

France—Rhone valley. *C.R.A. Sc. Paris* 157 (1913): 532–535, 564–568. **Depéret.**
L'histoire fluviale et glaciaire de la vallée du Rhône aux environs de Lyon. Par Charles Depéret.

Germany—Baltic Coast. **Brückmann.**
Beobachtungen über Strandverschiebungen an der Küste des Samlands. 3, Palmnicken. Von Dr. K. Brückmann. Leipzig: B. G. Teubner, 1913. Size $10 \times 7\frac{1}{2}$, pp. 117–144. *Maps and Illustrations. Price Mk.3. Presented by the Publisher.*
Earlier studies were noticed in vol. 41, p. 281.

Germany—Bavaria. *M. Deuts. Oesterr. Alpen-V.* (1912): 134–136, 162–164. **Schmidt.**
Ueber einen Riesengletschertopf bei Scheffau am Pfänder. Von Martin Schmidt. *Sketch-maps.*

Germany—Black Forest. **Brandt.**
Studien zur Talgeschichte der Grossen Wiese im Schwarzwald. Von Dr. Bernhard Brandt. (Abhandlungen zur badischen Erdkunde, herausgegeben von L. Neumann und A. Hettner; 3 Heft.) Karlsruhe: G. Braun, 1914. Size $9\frac{1}{2} \times 6$, pp. vii. and 53. *Maps and Sections. Price Mk.2.40. Presented by the Publishers.*

Holland—Historical. **Beekman and others.**
Geschiedkundige Atlas von Nederland. De Republiek in 1795, met de heerlijkheden, ambachten, enz. Door A. A. Beekman, Dr. W. A. F. Bannier, en J. W. Welcker. The Hague: M. Nijhoff, 1913. Size $10 \times 6\frac{1}{2}$, pp. 209. [*Text only, Atlas separate.*]

Malta. **Wignacourt.**

The odd man in Malta. By John Wignacourt. London: Chapman & Hall, 1914. Size 9 × 6, pp. viii. and 280. *Illustrations. Presented by the Publishers.*

Russia. **Kennard and Peacock.**

The Russian Year-Book for 1914. Compiled and edited by Dr. Howard P. Kennard, assisted by Netta Peacock. London: Eyre & Spottiswoode, 1913. Size 8 × 5½, pp. xx. and 754. *Maps and Diagrams. Price 10s. 6d. net. Presented by the Publishers.*

Russia—Finland—Geodesy. **Blomqvist and Renqvist.**

Fennia 31 (1909-11): No. 2, 1-307.

Das Präcisionsnivellement Finlands 1892–1910. Im Auftrage der Oberverwaltung der Wege- und Wasserbauten bearbeitet und zusammengestellt von Edv. Blomqvist und Henrik Renqvist.

Russia—Finland—Hydrology. *Fennia* 31 (1909–11): No. 3, 1-79. ——

Verzeichnis der wichtigsten Stromschnellen Finlands mit Angaben über ihre Länge, Fallhöhe, Wassermenge, und Wasserkraft. Veröffentlicht vom Hydrographischen Bureau der Oberverwaltung der Wege- und Wasserbauten. *Map.* [In Finnish and Swedish.]

Russia—Finland—Phytogeography. *Fennia* 31 (1909–11): No. 5, 1-10. **Tanner.**

Die Verteilung einiger Vegetationslinien im finnländischen Enontekis-Lappmark. Von V. Tanner. *Map.*

Straits of Gibraltar. **Sobral.**

Estrecho de Gibraltar. Por J. G. Sobral. Madrid, 1913. Size 7½ × 4½, pp. 62.

Sweden—Meteorology. **Westman.**

K. Svenska Vetenskaps-A. Handlingar 47 (1911): No. 8, pp. 38.

Sonnenscheindauer und Insolation in Stockholm und auf Häfringe. Von J. Westman.

Switzerland—Forestry. *Kew B.* (1913): 269–278. **Dallimore.**

Visit to the forests of Switzerland. By W. Dallimore.

See note in the March number, p. 335.

United Kingdom—Bristol. **Sanders.**

La région de Bristol. Par E.-M. Sanders. (Thèse présenté à la Faculté de Sciences de Paris.) Paris: Jouve et Cie., 1914. Size 10 × 6½, pp. 131. *Maps, Illustrations, and Diagrams. Presented by the Author.*

We are informed by the author that a few copies are for sale at Messrs. Banks (Promenade, Cheltenham) and Baker (The Mall, Clifton). *Price 3s. 6d.*

United Kingdom—Devon—Geology. **Ussher and others.**

Memoirs of the Geological Survey. England and Wales. Explanation of sheet 339. The geology of the country around Newton Abbot. By W. A. E. Ussher, with contributions by Clement Reid, J. S. Flett, and D. A. MacAlister. *Map, Illustrations, and Sections.*

United Kingdom—Gloucestershire—Phytogeography. **Tansley and Adamson.**

J. Ecology 1 (1913): 81–89.

Reconnaissance in the Cotteswolds and the forest of Dean. By A. E. Tansley and R. S. Adamson.

United Kingdom—Ireland—Wicklow. **Orpen.**

P.R. Irish A. 32 (1913): Sec. C, 41–57.

Rathgall, County Wicklow: Dún Galion and the "Dunum" of Ptolemy. By Goddard H. Orpen.

See note in the February number, 1914, p. 200.

United Kingdom—Isle of Wight. **Hargrove.**

Wanderings in the Isle of Wight. By Ethel C. Hargrove. London: A. Melrose, 1913. Size 7½ × 5, pp. xii. and 312. *Illustrations. Price 6s. net. Presented by the Publisher.*

United Kingdom—Norfolk. *J. Ecology* 1 (1913): 4–15. **Oliver.**

Some Remarks on Blakeney Point, Norfolk. By F. W. Oliver. *Diagram.*

ASIA.

Asia—Geological history *Petermanns M.* **59** (1913): II. 70–75. **Herrmann.**
Die alte Verbindung zwischen dem Oxus und dem Kaspischen Meer. Von Dr. Albert Herrmann. *Map.*
See note in the *Journal*, vol. **42**, p. 396.

Central Asia—Altai. *Petermanns M.* **59** (1913): II. 128–132. **Obrucheff.**
Das Kalkinskigebirge im westlichen Altai im orographischer und geologischer Beziehung. Von Prof. Wladimir Obrutschew. *Map.*

China—Historical. **Backhouse and Bland.**
Annals and memoirs of the Court of Pekin (from the sixteenth to the twentieth century). By E. Backhouse and J. O. P. Bland. London: W. Heinemann, [1914]. Size 10 × 6½, pp. x. and 531. *Illustrations. Price* 16*s. net. Presented by the Publisher.*

China—Mongolia. **Perry-Ayscough and Otter-Barry.**
With the Russians in Mongolia. By H. G. C. Perry-Ayscough and Captain R. B. Otter-Barry. London: John Lane, 1914. Size 9 × 6, pp. xxii. and 344. *Map and Illustrations. Price* 16*s. net. Presented by the Publishers.*

China—Wutai Shan. **Limpricht.**
M. Seminars Orient. Sprachen Berlin **16** (1913): 1 Abt., 141–176.
Eine Durchwanderung der Wutaischanketten. Von Dr. W. Limpricht.

Chinese Turkestan—Anthropology. **Joyce.**
Notes on the physical anthropology of Chinese Turkestan and the Pamirs. By T. A. Joyce. (From the *Journal* of the Royal Anthropological Institute, vol. **42**, July–December, 1912.) London, [1913]. Size 11 × 7, pp. 450–484. *Sketch-map, Diagrams, and Illustrations.*
Deductions from Sir Aurel Stein's observations.

French Indo-China—Cambodia. **Ricou.**
B. Économique, l'Indochine **16** (1913): 179–197.
Monographie du Srok de Chong-Kal. (Province de Siemréap, Cambodge.) Par E. Ricou. *Sketch-map.*

French Indo-China—Tongking. *Tour du Monde* **19** (1913): 433–456. **André.**
Sur la frontière Tonkinoise. Par Louis de Saint-André. *Sketch-map and Illustrations.*

India—Himalaya. **Bruce.**
Kulu and Lahoul. By Lieut.-Colonel the Hon. C. G. Bruce. London: E. Arnold, 1914. Size 9 × 6, pp. xii. and 317. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publisher.*

India—Himalayas. *Geol. Mag.*, V. **10** (1913): 532–536. **Oldham.**
The recent discussion on the origin of the Himalayas. By R. D. Oldham.

Malay Archipelago—Geomorphology. *Z. Ges. E. Berlin* 1913: 225–230. **Elbert.**
Geosynklinale und Rahmenfaltung, Zerrungsgebirge und Vulkanismus im australasiatischen Archipel. Von J. Elbert.

Malay Archipelago—Java. **Domin.**
Vegetationsbilder (*Karsten & Schenck*) **11** (1913): Plates 25–30.
Vegetationsbilder aus Java. Von K. Domin. *Illustrations.*

Malay States—Survey. **Survey Department.**
Federated Malay States. Report on Survey Department for the year 1912. By Colonel H. M. Jackson, Surveyor-General. Kuala Lumpur, 1913. Size 13 × 8½, pp. 32. *Maps.*

Persia—Kurdistan. **Price.**
A journey through Azerbaijan and Persian Khurdistan. By Morgan Philips Price. London: Published for the Persia Society, [1913]. Size 8½ × 5½. *Sketch-map and Illustrations.*

Russia—Caucasus—Daghestan. *National G. Mag.* **24** (1913): 1087–1140. **Kennan.**
An island in the sea of history. The highlands of Daghestan. By George Kennan. *Sketch-map and Illustrations.*

Russia—Caucasus—Wind. *Met. Z.* **30** (1913): 295–302. **Arndt.**
Ueber die Bora in Noworossisk. Von Arvid Arndt. *Diagram.*

Siam—Survey. **Survey Department.**
Siam. General report on the operations of the Royal Survey Department, season 1911–1912. Bangkok, 1913. Size 13 × 8½, pp. 46. *Maps. Presented by the Director of the Royal Survey Department.*

Turkey—Arabia. **Schmidt.**
Das südwestliche Arabien. Inaugural Dissertation . . . von Walther Schmidt. Halle a. S.: Gebauer-Schwetschke, 1913. Size 8½ × 5½, pp. 137. *Map.*
A systematic account of the geography, physical and human, of Yemen, based on a careful study of the literature on the subject.

Turkey—Asia Minor. **Philippson.**
Petermanns M., Ergänzungsheft **177** (1913): pp. iv. and 129.
Reisen und Forschungen im westlichen Kleinasien. 3 Heft: Das östliche Mysien und die benachbarten Teile von Phrygien und Bithynien. Von Dr. Alfred Philippson. *Map and Illustrations.*

Turkey—Asia Minor. *Petermanns M.* **59** (1913): II. 237–241. **Philippson.**
Das Vulkangebiet von Kula in Lydien, die Katakekaumene der Alten. Von Prof. Dr. Alfred Philippson. *Map and Illustrations.*

Turkey—Asia Minor—Historical. *J. Roman Studies* **3** (1913): 73–97. **Hunter.**
Cicero's journey to his province of 51 B.C. By L. W. Hunter. *Sketch-map.*

Turkey—Euphrates. *Deuts. Rundschau G.* **35** (1912–13): 466–476, 529–535. **Banse.**
Am Euphrat (Dēr-Bardād, 1908). Von Ewald Banse.

Turkey—Phytogeography. **Handel-Mazzetti.**
Vegetationsbilder (*Karsten & Schenck*) **10** (1912): Plates 25–36.
Mesopotamia. Von Heinrich Freiherr von Handel-Mazzetti. *Illustrations.*
Kurdistan. (By the same.) *Illustrations.*

Turkey—Railways. *B. Comité l'Asie Française* (1913): 402–405. **Caix.**
La France et les chemins de fer de l'Asie turque. Par R. C[aix]. *Sketch-map.*

Turkey—Syria—Dead sea. **Masterman.**
Palestine Explor. Fund, Quart. Statement (1913): 192–197.
Summary of the observations on the rise and fall of the level of the Dead Sea, 1900–1913. By Dr. E. W. G. Masterman. *Illustrations and Diagram.*
See note in the January number, 1914, p. 79.

Turkey—Waterways. *Weltverkehr u. Weltwirtschaft* **3** (1913): 169–173. **Grassmann.**
Die Schiffahrt auf Euphrat und Tigris. Von Dr. Joachim Grassmann.

AFRICA.

Abyssinia—Anthropogeography. *M. k.k. G. Ges. Wien* **56** (1913): 488–567. **Sawicki.**
Der Einfluss des geographischen milieus auf die rassiale und kulturelle Entwicklung Abessiniens. Von Dr. Ludomir R. v. Sawicki.

Africa—Zoogeography. *M.G. Ges. Hamburg* **27** (1913): 1–75. **Waibel.**
Lebensformen und Lebensweise der Tierwelt im tropischen Afrika. Versuch einer geographischen Betrachtungsweise der Tierwelt auf physiologischer Grundlage von Dr. Leo Waibel. *Map.*

Algeria—Desert-features. **Passarge.**
Geol. Charackterbilder (*Stille*), **Heft 17** (1913): 7 Plates.
Die Trockengebiete Algeriens. Von S. Passarge. *Illustrations.*

Belgian Congo—Katanga. **Deladrier and Robert.**
B.S.R.Belge G. **37** (1913): 233–254.
Quelques notes sur les Kundelungu, le Katanga septentrional et la main-d'œuvre indigène. Par Em. Deladrier et Maur Robert.

Egypt. **Low.**
Egypt in transition. By Sidney Low. London: Smith, Elder & Co., 1914. Size 8½ × 5½, pp. xxiv. and 290. *Portraits. Price 7s. 6d. net. Presented by the Publishers.*

Egypt—Ethnography. *Sitz. k. A. W. Berlin*, 1913: 769–801. **Meyer.**
Bericht über eine Expedition nach Aegypten zur Erforschung der Darstellungen der Fremdvölker. Von Eduard Meyer.

Egypt—Libyan Desert—Phytogeography. *Cairo Sc. J.* 7 (1913): 205–219. **King.**
The geographical distribution of some plants from the Libyan Desert. By W. J. Harding King.

German East Africa. *M.G. Ges. Hamburg* 27 (1913): 153–202. **Obst.**
Der östliche Abschnitt der Grossen Ostafrikanischen Störungszone (Irangi, Uassi, Ufiomi, Burungi, Ussandaui). Vorläufiger Bericht IV. der Ostafrika-Expedition der Hamburger Geographischen Gesellschaft. Von Dr. E. Obst. *Map and Illustrations.*

German S.W. Africa. **Streitwolf and Ambronn.**
M. Deuts. Schutzgeb. 26 (1913): 218–224.
Resultate der astronomischen Beobachtungen des Hauptmanns Streitwolf bei Gelegenheit seiner Erkundungsreise im Caprivi-Zipfel, 1908 bis 1910. Bearbeitet von L. Ambronn.

German S.W. Africa. *M. Deuts. Schutzgeb.* 26 (1913): 225–316. **Seiner.**
Ergebnisse einer Bereisung der Omaheke in den Jahren 1910–1912. Von Franz Seiner. *Maps, Profiles, and Illustrations.*

German S.W. Africa—Floods. **Nitsche.**
M. Deuts. Schutzgeb. 26 (1913): 215–217.
Der Ursprung der jährlichen Ueberschwemmung in Ovamboland. Von Georg Nitsche.

Kamerun. **Thorbecke.**
Auf der Savanne: Tagebuch einer Kamerunreise. Von Marie Pauline Thorbecke. Berlin: E. S. Mittler und Sohn, 1914. Size 8½ × 5½, pp. xii. and 231. *Sketch-map and Illustrations. Price Mk.4.*
Notes on this expedition were given in vol. 41, p. 167; vol. 42, p. 196.

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The Alleghenian divide, and its influence upon the freshwater fauna. By Dr. Arnold E. Ortmann. *Sketch-map and Diagrams.*
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Department of Commerce. U.S. Coast and Geodetic Survey. Geodesy. The California-Washington arc of primary triangulation. By A. L. Baldwin. Washington, 1913. Size 11½ × 9, pp. 78. *Sketch-maps.*

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United States—Meteorology. *Science* **38** (1913): 63–75. **Zon.**
The relation of forests in the Atlantic Plain to the humidity of the Central States and Prairie region. By Dr. Raphael Zon. *Sketch-maps.*
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U.S. Geol. Surv. Professional Paper 78 (1913): pp. 272.
Geology and ore deposits of the Philipsburg Quadrangle, Montana. By William Harvey Emmons and Frank Catheart Calkins. *Maps, Illustrations, and Sections.*

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Geology and ore deposits of the San Francisco and adjacent districts, Utah. By B. S. Butler. *Maps, Plans, Sections, and Illustrations.*

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Animal communities in temperate America, as illustrated in the Chicago region. A study in animal ecology by Dr. Victor E. Shelford. (The Geographical Society of Chicago, *Bulletin* No. 5.) Chicago, Ill. (London: Cambridge University Press), 1913. Size 10 × 6½, pp. xiii. and 362. *Maps, Illustrations, and Diagrams. Price* 12*s. net. Presented by the Publishers.*

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The Amazon expedition, sent out by the University Museum under the leadership of Dr. Farabee. (From the *Museum Journal*, Vol. 4, March, 1913.) Philadelphia, 1913. Size 10 × 7, pp. 12. *Portraits and Illustrations.*

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Junge fluviatile Aufschüttungen in den nördlichen argentinischen Anden. Von H. Keidel. *Illustrations.*

Argentine—Cordillera. *Petermanns M.* **59** (1913): II., 10–15, 79–84, 133–137. **Kühn.**
Aus den Hochkordilleren von San Juan (Argentinien). Von Dr. Franz Kühn. *Maps and Illustrations.*

Bolivia—Archæology. *M. k.k. G. Ges. Wien* **56** (1913): 226–236, 267–297. **Nestler.**
Beiträge zur Kenntnis der Ruinenstätte von Tiahuanaco. Von Prof. Julius Nestler. *Illustrations.*

Bolivia—Language. **Créqui-Montfort and Rivet.**
Linguistique Bolivienne. Les dialectes Pano de Bolivie. Par G. de Créqui-Montfort et P. Rivet. (From 'Muséon,' 1913.) Louvain, 1913. Size 10 × 6½, p. 62. *Sketch-map.*

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Geology of the region about Natal, Rio Grande do Norte, Brazil. By Olaf Pitt Jenkins. *Sketch-map, Sections, and Illustrations.*

Central America. *Petermanns M., Ergänzungsheft* **178** (1913): pp. 173. **Sapper.**
Die mittelamerikanische Vulkane. Von Dr. Karl Sapper. *Map.*

Central America—Hurricanes. *Deuts. Rundschau G.* **36** (1913–14): 14–21. **Krebs.**
Sturmkatastrophen auf Kuba und Florida im Oktober 1910 und 1909. Von Wilhelm Krebs. *Sketch-map and Diagram.*

Central America—Winds. *Ann. Hydrographie* **41** (1913): 497–511. **Lottermoser.**
Beiträge zur Kenntnis der Windverhältnisse über Mittelamerika und seiner Umgebung. Von Dr. E. Lottermoser. *Sketch-maps.*

Patagonia—Geology. *Sc. P.R. Dublin S.* **13** (1913): 600–606. **Fenton.**
Notes on recent pampa and other formations in Patagonia. By E. G. Fenton. *Illustrations.*

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Porvenir de la industria del jebe en el Perú. Por Emilio Castre.

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Geologic sketch of Titicaca Island and adjoining areas. By Herbert E. Gregory. *Sketch-maps, Illustrations, and Sections.*

Venezuela—Cartography. **Vivas.**
Trabajos recientes del mapa fisico y politico de Venezuela. Por J. Miguel Crespo Vivas. (From 'Revista Técnica del Ministerio de Obras Publicas, Publicación Mensual,' Ano 3°, Número 30, 1913.) Caracas, 1913. Size 13 × 9, pp. 419–426. *Sketch-maps.*

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Bismarck Archipelago. **Friederici.**
M. Deuts. Schutzgeb., Ergänzungsheft 7 (1913), pp. v. and 182.
Wissenschaftliche Ergebnisse einer amtlichen Forschungsreise nach den Bismarck-Archipel im Jahre 1908. III. Untersuchungen über eine melanesische Wanderstrasse. Von Dr. Georg Friederici. *Map.*

Hawaii—Kilauea. *Geol. Charakterbilder (Stille), Heft* **16** (1913): 8 Plates. **Heim.**
Lavafelder des Kilauea, Hawaii. Von Arnold Heim. *Illustrations.*

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Neu-Caledonien. Von Fritz Sarasin.

New Guinea—German. *Petermanns M.* **59** (1913): II. 177–181. **Keyssler**
Die erste Ersteigung der östlichen Gipfel des Finisterregebirges (Kaiser-Wilhelms-Land). Von Christian Keyssler. *Maps and Illustrations.*

New Zealand. **Ross.**
A climber in New Zealand. By Malcolm Ross. London: E. Arnold, 1914. Size 9 × 6, pp. xx. and 316. *Illustrations. Price 15s. net. Presented by the Publisher.*

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South Australia and Victoria—Boundary. ———
[Proceedings in connection with the case of the boundary between the State of South Australia and the State of Victoria, on appeal in the Privy Council from the High Court of Australia.] Record of proceedings (pp. xv. and 452); Tran-

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Les îles Wallis. Par Marcel Guieysse. *Sketch-map and Illustrations.*

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Antarctic—Geology. **Nordenskiöld.**
Handbuch der regionalen Geologie. Herausgegeben von Prof. Dr. G. Steinmann und Prof. Dr. O. Wilckens. Heidelburg: C. Winter (1910 ff.). Size 10½ × 7½ — Bd. 8, Abt. 6 (1913): Antarktis. Von Dr. Otto Nordenskiöld. Pp. 29. *Map.*

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Deutsche Antarktiske Expedition. Bericht über die Tätigkeit nach Verlassen von Südgeorgien. Von Dr. Erich Przybyllok. *Sketch-maps and Illustrations.*
See abstract in vol. 41, p. 356.

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Die Schneegrenze in der Antarktis. Von Ed. Brückner.

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Danmark-Ekspeditionen til Grønlands Nordostkyst 1906–1908, under Ledelse af L. Mylius-Erichsen. Bind 1. *Maps and Illustrations.*
Contains the general report by G. Amdrup (reviewed, vol. 42, p. 563); the hydrographical observations, by A. Trollé (*ante*, p. 195); Tidal observations, by H. A. D. Bistrup; Health conditions, by J. Lindhard; and Mylius Erichsen's Report brought home by Mikkelsen.

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Anthropogeographische Studien aus Grönland. Von Dr. M. C. Engell.

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Die Deutsche Wissenschaftliche Station auf Spitzbergen und die Schröder-Stranz Expedition. Von Prof. Dr. H. Hergesell und Dr. Kurt Wegener. *Maps.*

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Der "Guipa" Höhle in der Crossbai Spitzbergens. Von Dr. Kurt Wegener. *Plan and Illustrations.*

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Das Schrittmass und seine Umwandlung in Metermass. Ein Beitrag zur Anleitung für Beobachtungen auf Forschungen von Prof. Dr. Hans Löschner. *Diagram.*

Earth-Dimensions. *M. k.k. G. Ges. Wien* 56 (1913): 134–163, 203–225. **Böhm.**
Die längsten kontinentalen und ozeanischen Erstreckungen. Von Dr. August Böhm Edlen von Böhmersheim. *Diagram.*

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Geoid und Erdellipsoid. Von F. R. Helmert.

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Der Schwarzschildsche Libellensextant. Von Dr. J. Möller. *Illustration and Diagrams.*

Survey in High Latitudes. *Petermanns M.* 59 (1913): II. 123–126. **Wedemeyer.**
Geographische Ortsbestimmung in sehr hohen Breiten. Von Dr. August Wedemeyer.

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Ueber die internationale Zeitkonferenz zu Paris im Oktober 1912. Von Prof. Dr. E. Kohlschütter.

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Climate and Soil. *Naturw. Wochenschrift* **12** (1913): 763–767. **Fischer.**

Beziehungen zwischen Bodenbildung und Klima. Von H. Fischer.

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Theoretische Ermittlung des günstigsten Neigungswinkels für die Erwärmung einer Berghalds. Von Dr. C. Schoy. *Diagram.*

Denudation—Soil-flow. *Z. Ges. E. Berlin* (1913): 115–128. **Volz.**

Ueber Bodenversetzung in den Tropen. Von Wilhelm Volz. *Sketch-map and Illustrations.*

Observations based on the author's researches in Sumatra.

Geological History. **Andrée.**

Petermanns M. **59** (1913): II. 117–123, 186–190, 245–249.

Die paläogeographische Bedeutung sedimentpetrographischer Studien. Von Dr. K. Andrée.

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Die Abhängigkeit der Form der Landoberfläche vom inneren Bau. Von Alfred Hettner.

Geophysics. *Sitzb. K.A.W. Wien*, Abt. IIa. **122** (1913): 479–501. **Spitaler.**

Die Achsenschwankungen der Erde als Ursache der Auslösung von Erdbeben. Von Prof. Dr. R. Spitaler. *Diagrams.*

Oceanography—North Atlantic. **Murray and Hjort.**

Report on the scientific results of the *Michael Sars* North Atlantic deep sea expedition, 1910. Carried out under the auspices of the Norwegian Government and the superintendence of Sir John Murray and Dr. Johan Hjort. Vol. 3, part I. Zoology. Bergen: John Grieg, [1914]. Size 12½ × 10, pp. [240]. *Sketch-maps and Illustrations. Price 70s.*

Oceanography—Light-penetration. **Grein.**

B.I. Oceanog. Monaco, No. 266 (1913): pp. 8.

Ein Meeres-photometer. Par Klaus Grein. *Illustrations.*

Terrestrial Magnetism. **Birkelund.**

The Norwegian Aurora Polaris Expedition, 1902–1903, vol. 1. On the cause of magnetic storms and the origin of terrestrial magnetism. By Kr. Birkelund. (Second section.) Christiania (London: Longmans, Green & Co.), 1913. Size 13 × 10, pp. x. and 319–801. *Maps and Illustrations. Purchased.*

Volcanoes and Climate. *J. Franklin I.* **176** (1913): 131–172. **Humphreys.**

Volcanic dust and other factors in the production of climate changes, and their possible relation to ice ages. By Dr. W. J. Humphreys. *Diagrams.*

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Anthropogeography. **Schmidt.**

Natur und Mensch. Von Prof. Dr. Max Georg Schmidt. Leipzig, etc.: B. G. Teubner, 1914. Size 7½ × 5, pp. iv. and 106. *Illustrations. Price Mk.*1.25. *Presented by the Publisher.*

Anthropogeography. *Scottish G. Mag.* **29** (1913): 480–489. **M'Cance.**

The geographical factor in civilization. By Thos. W. M'Cance.

Anthropogeography. *Z. Ges. E. Berlin* (1913): 128–138. **Rühl.**

Geopsychologie. Von Alfred Rühl.

On the mental characteristics of peoples living under diverse geographical conditions.

Anthropogeography—Nomads. *G.Z.* (1913): 305–319, 369–382. **Hahn.**

Die Hirtenvölker in Asien und in Afrika. Von F. Hahn.

Commercial—Bamboo. **Hosseus.**

Botanische und kolonialwirtschaftliche Studien über die Bambusstaude. Von Dr. Carl Curt Hosseus. Dresden, 1913. Size 9½ × 6, pp. 69. *Illustrations.*

Commercial—Banana. **Fawcett.**

The banana: its cultivation, distribution, and commercial uses. By William Fawcett. London: Duckworth & Co., 1913. Size 9 × 6, pp. xi. and 287. *Illustrations. Price 7s. 6d. net. Presented by the Publishers.*

Commercial—Iron. *G.Z.* **19** (1913): 266–285. **Eckert.**

Die Eisenvorräte der Erde. Von Max Eckert. *Map.*

Commercial—Shipping. *G.Z.* **19** (1913): 425–435, 487–498. **Oppel.**

Schiffbesitz und Schiffbau in geographischer Verbreitung. Von A. Oppel.

Commercial—Shipping—Lifeboat. **Methley.**

The life-boat and its story. By Noël L. Methley. London: Sidgwick & Jackson, 1912. Size 9 × 5½, pp. xi. and 318. *Illustrations. Presented by Miss Alice A. Methley.*

Historical—Portuguese discoveries. **Martins and others.**

The golden age of Prince Henry the Navigator. By J. P. Oliveira Martins. Translated . . . by J. J. Abraham and W. E. Reynolds. London: Chapman & Hall, 1914. Size 9 × 5½, pp. ix. and 324. *Plan and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

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Dernschwam. *Deuts. Rundschau G.* **35** (1912–13): 535–546. **Babinger.**

Hans Dernschwam, ein Kleinasienforscher des 16. Jahrhunderts. Von Franz Babinger. *Illustration.*

Hacquet. *Münchener G. Studien* (*Günther*) **27** (1913): pp. 127. **Jakob.**

Belsazar Hacquet und die Erforschung der Ostalpen und Karpathen. Von Georg Jakob. *Sketch-map.*

Livingstone. **Michieli.**

La moglie di un grande esploratore Maria Moffat-Livingstone. Di Adriano Augusto Michieli. (From the *Rivista per le Signorine*, 15 Aprile, 1913.) Modena, 1913. Size 9 × 6½, pp. 16. *Portrait.*

M'Crindle. *Scottish G. Mag.* **29** (1913): 490–491. **Blaikie.**

Dr. John Watson M'Crindle. By W. B. B[laikie].

This well-known writer on the early Western knowledge of India died in July 1913, in his eighty-ninth year.

Scheimpflug. *Deuts. Rundschau G.* **35** (1912–13–14): 393–400. **Peucker.**

Theodor Scheimpflug. Von Dr. Karl Peucker. *Portrait.*

Scheimpflug, who died in 1911, was an original worker in the field of survey-method (cf. *Journal*, vol. **38**, p. 198).

Sclater. **Evans and others.**

Philip Lutley Sclater. By A. H. Evans, J. Graham Kerr, and Michael J. Nicoll. (From the *Ibis* for October, 1913.) [London, 1913.] Size 8½ × 5½, pp. 642–686. *Portrait.*

GENERAL.

Paradox. **Gardner.**

A journey to the Earth's interior: or, Have the Poles really been discovered? By Marshall B. Gardner. Aurora, Ill. [Dewey Publ. Co.], 1913. Size 8½ × 5½, pp. 69. *Sketch-maps and Illustrations. Presented by the Author.*

One of the most extraordinary of the paradoxes with which geographers are from time to time assailed. The writer believes that the Earth is a hollow shell, with continents and oceans on the inside as well as out, lighted by a central sun, and to be reached through openings at the poles.

Education—Outline maps. **Johnston.**

The Scholar's geographical exercise book: The British Empire. London: W. & A. K. Johnston, [1913]. Size 10½ × 7½, pp. 16. *Outline Maps only. Price* 2*d. net. Presented by the Publishers.*

Education—Text-book. **Mill and Allen.**

Elementary commercial geography. By Dr. Hugh Robert Mill; revised by Fawcett Allen. Cambridge: University Press, 1914. Size 7 × 4½, pp. xii. and 215. *Price* 1*s.* 6*d. net. Presented by the Publishers.*

Education—Text-book. **Mort.**

A commercial geography of the British Isles. By Frederick Mort. Edinburgh, etc.: Oliver & Boyd, [1914]. Size 7½ × 5, pp. viii. and 152. *Sketch-maps and Diagrams. Price* 1*s. Presented by the Publishers.*

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

Austria-Hungary. K. u. K. Militärgeographisches Institut.

Spezialkarte der österreichisch.-ungarischen Monarchie und anschliessender Gebiete. Scale 1 : 75,000 or 1 inch to 1·2 stat. miles. Sheet (new edition): Zone 19, Kol. VI., Toblach und Cortina d'Ampezzo. Size 16 × 22 inches. Vienna: K. u. K. Militärgeographisches Institut, 1913. *Price* 1*M. each sheet.*

Balkan Peninsula. Peucker.

Karte von Südost-Europa. Die Staaten der Balkanhalbinsel mit Teilen von Oesterreich-Ungarn bis Wien und Budapest sowie mit Rumanien. Massstab 1 : 2,000,000 (1 inch to 31·56 stat. miles). Bearbeit von Dr. Karl Peucker. VI. Auflage mit den endgültigen neuen Grenzen. Size 30 by 27 inches. Vienna: Artaria & Co., 1914. *Price* 1.80*Kr. Presented by the Publishers.*

A general map of the Balkan States and parts of adjacent countries, showing in colours the boundaries according to the latest arrangements. A table giving the population of the chief cities and towns, and other useful information, is given in the lower left-hand corner of the map.

Balkan Peninsula. Peucker.

Die zentralen Balkanländer zwischen Adria und Pontus. Bulgarien, Albanien, Neu Serbien, Montenegro, und Griechische Grenze. Massstab 1 : 814,000 (1 inch to 13·6 stat. miles). V. Auflage mit den edgültigen neuen Grenzen. Bearbeitet von Dr. Karl Peucker. Size 24 by 42 inches. Vienna: Artaria & Co., 1914. *Price* 3*Kr. Presented by the Publishers.*

This is the fifth edition of this map, with the boundaries of the Balkan States shown according to the latest arrangement.

British Isles. Woodward.

Stanford's Geological Atlas of Great Britain and Ireland. With plates of characteristic fossils preceded by descriptions of the geological structure of Great Britain and Ireland and their counties; of the Channel Islands; and of the features observable along the principal lines of railway. By Horace B. Woodward, F.R.S., F.G.S. 3rd edit. London: Edward Stanford, Ltd., 1914. *Price* 12*s.* 10*d. post free. Presented by the Publishers.*

This useful little work has now reached its third edition. The first dealt only with Great Britain and the Isle of Man, and appeared in 1904. In the second, issued in 1907, the scope was enlarged by a sketch of the geological features of Ireland, with a geological map and sections, and the present edition has been amplified by an account of the geological features of the Channel Islands, and other additions. The work, 7½ by 5 inches in size, now consists of 214 pages of letterpress, with index, sections, and diagrams, 39 coloured geological maps, and 32 plates of fossils.

British Isles. Ordnance Survey.

Sheets published by the Director-General of the Ordnance Survey, from February 1 to 28, 1914.

England and Wales.

6-inch maps, revised:—

Cheshire, 21 S.E., 64 N.E. **Sussex,** 2 N.E., 72 N.E. **Yorkshire,** 87 S.W., 105 S.E. With contours in blue. *Price* 1*s. each.* **Berkshire,** 7 N.E., 14 S.E., 24 N.W., 30 S.W., 32 S.W. **Denbigh,** 39 N.W. **Flint,** 3 S.W., 14 N.W. **Flint** (Det. No. 2), 26 N.E. **Lancashire,** 39 S.W., 40 S.E., 42 S.E., 43 S.E. (46 N.W. and 46 N.E.), 46 S.E. **Oxford,** 43 N.E., 57 S.W. **Sussex,** 10 S.W., 12 N.W., 12 S.E., 20 S.E., 23 N.W., 23 S.E., 33 N.W., 33 N.E., 33 S.E., 34 N.W., 34 N.E., 35 N.W., 35 S.W., 36 S.W., 47 N.E., 49 S.W., 49 S.E., 50 N.W., 50 S.W., 61 N.W., 62 N.W. **Yorkshire,** 57 N.E., 73 S.W., 73 S.E., 75 N.W. With contours in red. *Price* 1*s. each.*

1 : 2500 scale maps:—

Houses stippled, and areas. *Price* 3*s. each.*

Carnarvon, 7–4, 16, 8–1, 2, 10, 12, 12–7, 17–7, 18–4. **Cornwall,** 38–9, 45–4. **Devon,** 117–10, 14, 123–2, 3, 4, 124–9. **Durham,** 58–(5 and 6), *price* 1*s.* 6*d.* **Hertfordshire,** 39–10, 12, 16, 40–1, 3, 4, 6, 7, 8, 9, 41–3, 4, 6, 10, 11, 43–2, 6, 7, 44–6, 8, 11, 45–1. 47–2, *price* 1*s.* 6*d.* **Lancashire,** 2–9, 14, 5–1, 3, 5, 6, 7, 9, 10, 11. 2–(7 and 8

price 1*s.* 6*d.* **Middlesex,** 1–3, 6, 7, 11, 2–10, 5–8, 11, 16, 9–11, 12, 10–4, 9, 10. 9–15, *price* 1*s.* 6*d.* **Nottingham,** 42–11, 15, 43–3, 4, 6, 7, 8. **Surrey,** 5–10, 13, (14 and 15), 12–2, 3, 26–10, 11, 14, 34–2, 3. 6–13, 14, 15, *price* 1*s.* 6*d. each.* **Warwick,** 16–11. **Westmorland,** 47–6, 7, 12, 14, 48–5. **Yorkshire,** 11–16, 13–14, 16, 14–13, 24–2, 3, 4, 25–1, 2, 3, 4, 8, 16, 26–8, 9, 12, 13, 14, 15, 16. 26–7, 27–(2 and 1), *price* 1*s.* 6*d. each.* **Yorkshire** (2nd revision), 233–15, 248–2, 6, 7, 8, 11.

Messrs. E. Stanford, Ltd., London Agents.

British Isles—England and Wales. **Bacon.**

Bacon's Motoring and Cycling Maps. Half-inch series. Scale 1 : 126,720 or 1 inch to 2 stat. miles. Sheets: North Devon; South Devon. Size 24 by 34 inches. London: G. W. Bacon & Co., Ltd., [1914]. *Price* 1*s. each sheet. Presented by the Publishers.*

British Isles—England and Wales. **Gross.**

"Geographia" Two miles to one inch map of England and Wales. By Alexander Gross. Sheets: 15, Cornwall; 16, Devonshire; 17, Dorset and Somerset; 18, Portsmouth and Southampton District; 19, Kent and East Sussex. London: "Geographia," Ltd., 1914. *Price, mounted on cloth,* 3*s.* 6*d. net each sheet. Presented by the Publishers.*

Five sheets of a series of road maps, decidedly crude and diagrammatic in style, prepared for the use of motorists and cyclists. The whole series will consist of nineteen sheets.

British Isles—Exeter. **Bacon.**

Bacon's plan of Exeter and suburbs. Scale 1 : 10,560 or 6 inches to 1 stat. mile. Size 27 by 28 inches. London: G. W. Bacon & Co., Ltd., [1914]. *Price* 1*s. net. Presented by the Publishers.*

A coloured plan, somewhat rough in style of production, with an index to place-names.

British Isles—Leeds. **Bacon.**

Bacon's New Plan of Leeds and suburbs. Scale 1 : 10,560 or 6 inches to 1 stat. mile. Size 22 by 27 inches. London: G. W. Bacon & Co., Ltd., [1914]. *Price* 1*s. net. Presented by the Publishers.*

A black and white plan, with parks and recreation grounds green and water blue. There is an alphabetical index to streets, buildings, etc., the names of which, on the plan, are not so legible as they might be.

British Isles—London. **Stanford.**

Bacon's "Citizen" Series Maps of London, showing the different areas controlled by Government Departments, Local Authorities, and Supply Companies, having statutory powers in and around the City and County of London. Edited by William Stanford. London: G. W. Bacon & Co., Ltd., [1914]. *Price* 7*s.* 6*d. Presented by the Publishers.*

For all who are interested in the control of public affairs connected with the Metropolis, this atlas should be of considerable importance and service. It contains eighteen clearly drawn and well-coloured maps, of which the following are the titles: III., City of London, showing wards; IV., V., Port of London, river Thames, showing wharves; VI., London Fire Brigades; VII., Registration Areas; VIII., Coroners' Courts; IX., Postal Districts; X., Police Divisions, Steam Railways; XI., Water Supply; XII., Electric Supply; XIII., Gas Supply; XIV., County Courts; XV., Police Courts; XVI., Petty Sessions; XVII., Parliamentary Divisions; XVIII., Parliamentary and Metropolitan Boroughs; XIX., Boroughs, etc.; XX., Unions.

Thirteen of these plans were published last year in Bacon's Atlas of London.

British Isles—London. **Stanford.**

A map showing proposed railways, tramways, and other schemes affecting London, in connection with Bills where Plans have been deposited in Parliament—Session 1914. Scale 1 : 63,360 or 1 inch to 1 stat. mile. London: Edward Stanford, Ltd., 1914. *Price* 2*s.*

A new edition of a usful map which appears every year.

Europe. **International Geological Commission.**

Carte geologique internationale de l'Europe. 49 feuilles à l'échelle de 1 : 1,500,000 (1 inch to 23·67 stat. miles). Livraison VIII. Contenant les feuilles E i., F i., G i.–vii. Berlin: Dietrich Reimer (Ernst Vohsen), 1913. *Presented through the Royal Society, London.*

The sheets contained in this part include Arctic Russia from the White sea to the Petchora river, and the whole of eastern Russia as far south as the Caspian sea, and the Caucasus mountains. The title sheet, and sheet of explanation to colours, are also given in the same portfolio, so that the map is now complete, although new editions of the sheets are already in preparation. This map, agreed upon at the International Geological Congress, which met at Bologna in 1881, has been published under the general superintendence of an International Commission composed of seventeen eminent geologists representing the principal countries of Europe. The actual production and editing of the map has been carried out under the direction of Messrs. Beyrich, Hauchecorne, and Beyschlag, the representatives of Germany on the Commission, under the charge of the latter of whom it has now been brought to completion. The map supplies a long-felt need of a good general geological map of the whole of Europe on a fairly large scale. It is an excellent specimen of colour printing, and Messrs. Dietrich Reimer, of Berlin, at whose well-known cartographical establishment the map has been produced, are to be congratulated upon the manner in which they have carried out their work.

Europe, Central. **K. Preuss. Landesaufnahme.**

Uebersichtskarte von Mitteleuropa. Herausgegeben von der Kartogr. Abteilung der Kgl. Preuss. Landesaufnahme, 1913. Scale 1 : 300,000 or 1 inch to 4·7 stat. miles. Sheet: Pilsen. Size 15 by 18 inches. Berlin: R. Eisenschmidt.

France. **Ministre de l'Intérieur, Paris.**

Carte de la France dressée par ordre du Ministre de l'Intérieur. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheets: iv.–15, Sizun; iv.–16, Châteaulin; vii.–14, Plancoët; x.–30, La Teste; xi.–37, Laruns; xii.–12, Lisieux; xii.–18, La Flèche; xiii.–24, Confolens; xvii.–12, Senlis; xviii.–10, Chauny; xxi.–34, Arles; xxiv.–36, Toulon; xxv.–20, Mortea; xxvi.–25, Chamonix; xxvii.–32, Fontan. Size 13 by 17 inches. Paris: Hachette et Cie., 1913. *Price* 0.80 *Fr. each sheet.*

These are new editions.

Germany. **K. Preuss. Landesaufnahme.**

Karte des Deutschen Reiches. Königreich Preussen. Herausgegeben von der Kartogr. Abteilung der K. Preuss. Landesaufnahme, 1913. Scale 1 : 100,000 or 1 inch to 1·6 stat. miles. Sheets: 48, Ge. Bruch; 72, Braunsberg; 101, Elbing; 132, Christburg; 196, Briesen; 225, Bromberg; 410, Eschwege. Size 11 by 14 inches. Berlin: R. Eisenschmidt.

Germany—Bavaria. **K. Bayer. Generalstab.**

Der topographische Altas von Bayern 1 : 50,000 (1·3 inch to 1 stat mile). Bearbeitet in dem topographischen Bureau des K. B. Generalstabes. Sheets: 88, Immenstadt (west); 100, Mädelegabel. Each 21 by 17 inches. Munich: T. Riedel, 1912.

Continuation of the sheets noticed in the March number of the *Geographical Journal.*

Switzerland. **Kümmerly and Frey.**

Offizielle Eisenbahnkarte der Schweiz. Scale 1 : 500,000 or 1 inch to 7·8 stat. miles. Bern: Kümmerly & Frey, 1914.

Turkey. **K. u. K. Militärgeographisches Institut, Vienna.**

Adrianopel. Zustand der Festung und Arbeiten des Angriefers 1912–13. Scale 1 : 40,000 or 1·58 inch to 1 stat. mile. Size 27 by 27 inches. Vienna: K. u. K. Militärgeographisches Institut, 1913.

A plan of Adrianople and environs, showing the position of the defending and attacking forces during the late siege. Relief is given by contour lines at 4-metre vertical intervals, every tenth metre being accentuated. The plan itself is printed in light grey, while the positions of the defending forces are in red, and those of the besiegers in blue.

ASIA.

Asia Minor. **Dominian.**

Distribution of mineral products and railways of Asia Minor. By Leon Dominian. Scale 1 : 6,000,000 or 1 inch to 94·7 stat. miles. From *Documents Cartographiques de Géographie Économique*, 1913, No. 2. Bern: Kümmerly & Frey, 1913. *Presented by Leon Dominian, Esq.*

A small-scale map, including Asia Minor, Armenia, Syria, Mesopotamia, and Egypt, showing relief by shading and colour tinting, the location of minerals by coloured symbols and letters, and railways in operation, under construction, and

proposed. The lines are in different colours indicating the nation by which the construction has been undertaken. Although more of a diagram than a map, it is useful so far as it goes; the information is too general to give any detail or particulars. The representation of the geographical features might have been improved if the Society's map of the region, published a few years ago, had been made use of. The map is accompanied by four pages of letterpress by the author, and forms part of No. 2 (1913) of the 'Documents Cartographiques de Géographie Économique,' published by MM. Gaston Michel and Charles Knapp, at the geographical establishment of Kümmerly & Frey, in Bern.

Russia. **Military Topographical Dept., St. Petersburg.**

Map of the Southern Frontier Regions of Asiatic Russia. Scale 1 : 1,680,000 or 1 inch to 26·5 stat. miles. Sheet XXI. Krasnovodsk-Khiva. Size 21 by 23 inches. St. Petersburg: Military Topographical Department, 1913.

This is a new edition.

AFRICA.

Algeria. **Gouvernement Général de l'Algérie.**

Département de Constantine. Carte des Voies de Communication. Dressée par ordre de M. Ch. Lutaud, Gouverneur-Général. Scale 1 : 400,000 or 1 inch to 6·3 stat. miles. Size 26 by 40 inches. Algiers: Gouvernement Général de l'Algérie, Service des Cartes et Plans, 1914.

This is a new edition.

Algeria. **Service Géographique de l'Armée, Paris.**

Carte de l'Algérie. Scale 1 : 200,000 or inch to 3·15 stat. miles. Sheets: 10, Souk el Arba; 15, Akbou; 19, Le Kef; 26, Bou Teleb; 29, Thala. Size 12 by 20 inches. Paris: Service Géographique de l'Armée, 1912–13. *Price* 0.70 *fr. each sheet.*

British East Africa. **Geographical Section, General Staff.**

Africa. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. East Africa Protectorate. Sheets: North A 37–S. Baringo. Printed at the War Office, 1914. London Agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price* 1*s.* 6*d. net each sheet. Presented by the Director of Military Operations.*

Cape of Good Hope. **Geographical Section, General Staff.**

Africa. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Cape of Good Hope. Sheets: South H 34–K, Prieska; South H 34–L, Douglas. Size 18 by 16 inches. Drawn and printed at the War Office, 1914. London Agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price* 1*s.* 6*d. net each sheet. Presented by the Director of Military Operations.*

Egypt. **Egyptian Survey Department.**

Topographical map of Egypt. Scale 1 : 10,000 or 6·3 inches to 1 stat. mile. Sheets: N.E. 12–8, 16–8, 16–13, 16–16, 17–9, 17–10, 17–17, 18–9, 18–10, 18–11, 18–12, 18–13, 18–14, 18–19, 19–10, 19–11, 19–12, 19–13, 19–15, 19–16, 20–11, 20–13, Mudirîa Sharqîa. Each 19 by 20 inches. Cairo: Survey Department, 1913. *Presented by the Director-General, Egyptian Survey Department.*

Egyptian Sudan. **Survey Office, Khartoum.**

Africa. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Anglo-Egyptian Sudan. Sheets: 35–L, Deraheib; 45–A, Dongola; 45–E, Debba; 78–A, Ghaba Shambe; 78–E, Atwot; 78–I, Amadi. Size 18 by 25 inches. Khartoum: Survey Office, 1913. *Price* 10 *P.T. each sheet. Presented by the Director of Surveys, Khartoum.*

Ivory Coast. **Meunier.**

Côte d'Ivoire. Par A. Meunier. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Sheets: 4D, 2E, 3E, 4E, 1F, 2F, 3F, 4F, 1G, 2G. Each 18 by 26 inches. Paris: Librairie de l'Office Colonial, [1914]. *Presented by M. A. Meunier, Géographe du Ministère des Colonies, Paris.*

The title and particulars of this map are as above, and not as previously given in the March number of the *Geographical Journal* (p. 358). The map is M. Meunier's personal production, and later on he will issue sheets giving the data used in its compilation.

Morocco. **Fallex.**

Maroc par Maurice Fallex. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. Size 37 by 48 inches. Paris: Ch. Delagrave, [1913]. *Price* 7.50 *fr.*

A boldly executed map of Morocco and Western Algeria, with relief shown by colour tints superimposed upon light shading. The contour intervals in metres are

0 to 200, 200 to 500, 500 to 1000, and above 1000. This map also shows communications, and other general information. Plans of Marrakech, Fez, Tangier, and a small geological map of Morocco are given as insets.

Transvaal. **Geographical Section, General Staff.**

Africa. Scale 1 : 125,000 or 1 inch to 1·97 stat. miles. Sheet: South G 35–P II. Krugersdorp. Drawn and printed by the War Office, 1914. London agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price* 1*s.* 6*d. net each sheet. Presented by the Director of Military Operations.*

Tripoli. **Istituto Geografico Militare, Florence.**

Tripoli citta e suoi dintorini. Rilievo eseguito dal personale dell' Istituto Geografico Militaire messo a disposizione del Commando del Corpo d'occupazione. Scale 1 : 25,000 or 2·5 inch to 1 stat. mile. 4 sheets, each 16 by 14 inches. Florence: Istituto Geografico Militare, 1912.

A black and white map based on the reconnaissance sketches and surveys of Italian officers during the recent military operations. It includes the coast country for about 14 miles to the east and 6 miles to the west of the town of Tripoli.

Tunis. **Service Géographique de l'Armée, Paris.**

Carte de la Tunisie. Scale 1 : 100,000 or 1 inch to 1·6 stat. miles. Sheets: LXVIII., Mehamla; LXXV., Gabès; LXXXIII., Mareth; XCVI., Sabria; CII., Alouet el Gounna; CIX., Sidi Toui; CX., El Magta; CXVII., El Ouara. Size 12 by 19 inches. Paris: Service Géographique de l'Armée, 1912–14. *Price* 1.20 *fr. each sheet.*

AMERICA.

Brazil—Parana. **Martins.**

Mappa do Estado do Parana. De Romario Martins. Scale 1 : 1,000,000 or 1 inch to 15·78 stat. miles. Size 37 by 36 inches. S. Paulo: Hartmann Reichenbach, 1913. *Presented by Sr. Romario Martins.*

A boldly drawn map of the state of Paraná, printed in colours, showing railways working, under construction, and proposed. Relief is in brown shading, and water blue. In the lower left-hand corner there is a bird's-eye view of the Grandes Saltos do Ygoassú, and in another a plan of the Bays of Paranagoá, Antonina, and Larangeira, on the scale of 1 : 400,000. There is also a vertical section across the state, with altitudes.

Canada. **Dept. of the Interior, Ottawa.**

Sectional map of Canada. Scale 1 : 190,080 or 1 inch to 3 stat. miles. Sheets: 73, Winnipeg, Manitoba, revised to November 29, 1913; 269, Prince Albert South, Saskatchewan, revised to November 29, 1913; 315, Edmonton, Alberta, revised to November 29, 1913; 516, McMurray, Alberta, revised to November 29, 1913. Ottawa: Department of the Interior, Topographical Surveys Branch, 1913. *Presented by the Department of the Interior, Ottawa.*

Canada. **Dept. of the Interior, Ottawa.**

Map showing branches of Chartered Banks in Manitoba, Saskatchewan, and Alberta. Scale 1 : 1,584,000 or 1 inch to 25 stat. miles. Prepared in the Railway Lands Branch under the direction of F. C. C. Lynch, Superintendent. 2nd edit. Size 16 by 35 inches. Ottawa: Department of the Interior, 1914. *Presented by the Department of the Interior, Ottawa.*

Canada. **Geographical Section, General Staff.**

Canada. Scale 1 : 126,720 or 1 inch to 2 stat. miles. Sheet: Lachine, Quebec. Size 18 by 25 inches. Geographical Section, General Staff, War Office, 1913. London agents: E. Stanford, Ltd.; Sifton Praed & Co.; T. Fisher Unwin. *Presented by the Director of Military Operations.*

Canada—British Columbia. **Dept. of Lands, B.C.**

British Columbia: Mining Divisions, scale 1 : 1,900,800 or 1 inch to 30 stat. miles. Victoria, B.C.: Department of Lands, 1913. *Presented by the Surveyor-General of British Columbia.*

A general map without hill-shading, giving the names and boundaries of mining divisions, mining recording offices and sub-recording offices in brown. The map also shows railways, trails, mining camps and villages, post offices, Hudson Bay Co.'s ports, mission stations, in addition to the special information with which it is primarily concerned.

Canada—British Columbia. **Dept. of Lands, B.C.**

Map of East and West Kootenay, scale 1 : 506,880 or 1 inch to 8 stat. miles. Third issue. Mining divisions in brown. Size 30 by 26 inches. Victoria : Department of Lands, 1911. *Presented by the Surveyor-General of British Columbia.*

An outline map showing railways, boundaries, and general names in black, water blue, and mining divisions, with their names in reddish brown.

Canada—British Columbia. **Dept. of Lands, B.C.**

South-Western Districts, scale 1 : 760,320 or 1 inch to 12 stat. miles. Second issue. Land district boundaries outlined. Victoria : Department of Lands, 1912. *Presented by the Surveyor-General of British Columbia.*

This map extends from 48° to 52° N. lat., and from about 120° 20′ to 128° 40′ W. long., and includes Vancouver island, with the adjacent part of British Columbia. It is a somewhat roughly drawn outline in black and blue, with railways and boundaries in red.

Canada—British Columbia. **Dept. of Lands, B.C.**

Yale district and portion of adjacent districts of British Columbia, scale 1 : 508,880 or 1 inch to 8 stat. miles. Second issue. Size 39 by 26 inches. Victoria : Department of Land, 1912. *Presented by the Surveyor-General of British Columbia.*

This is the same map as the preceding as regards outline and general information, with the boundaries of land districts added in brown.

Canada—British Columbia. **Dept. of Lands, B.C.**

Pre-emptor's Map. North-easterly portion of Graham Island, Queen Charlotte islands. Scale 1 : 126,720 or 1 inch to 2 stat. miles. Victoria, B.C. : Department of Lands, 1913. *Presented by the Surveyor-General of British Columbia.*

Shows surveyed lands open for pre-emption on November 18, 1913.

Canada—British Columbia. **Surveyor-General's Office, Victoria, B.C.**

British Columbia, Degree Sheet Series. Scale 1 : 126,720 or 1 inch to 2 stat. miles. Sheets : Duncan River, revised to August 1, 1913; Fernie, revised to April 1, 1913; Upper Elk River, revised to August 15, 1913. Victoria, B.C. : Surveyor-General's Office, 1913. *Presented by the Surveyor-General of British Columbia.*

Black and white outline sheets without hills.

Canada—Vancouver Island. **Dept. of Lands, B.C.**

Southerly portion of Vancouver island, scale 1 : 253,440 or 1 inch to 4 stat. miles. Size 27 by 41 miles. Victoria : Department of Lands, 1913. *Presented by the Surveyor-General of British Columbia.*

A useful and well-executed coloured map on a sufficiently large scale to show considerable detail. Crown lands, timber leases and timber licences, and Indian and Government reserves are all distinguished by different colours ; while railways, boundaries, post offices, roads, trails, and other information are also given by well-selected symbols.

AUSTRALIA.

Australia—Canberra. **Taylor.**

Relief map showing proposed Federal Capital Territory of Canberra. By Griffith Taylor, B.SC., B.E., B.A., F.G.S. Horizontal scale 1 : 71,280 or 1 inch to 1·125 mile. Melbourne, 1910. *Presented by Griffith Taylor, Esq.*, B.SC.

This interesting model was constructed by Mr. Griffith Taylor from the recent surveys made in connection with the selection of the site for the new Commonwealth capital, which he describes in the paper published in the present number of the *Geographical Journal*. The model is made of plaster, and the land is coloured green and water blue. It measures 43 inches north and south and 34 inches east and west, and the area included extends to a distance varying from 13 to 21 miles around the site of Canberra, and covers about 260 square miles. The relief is boldly shown in a general manner, but no contour lines are given. The heights of some of the more important hills are indicated by figures.

GENERAL.

World. **De Agostini.**

Calendario Atlante De Agostini 1914 con notiziario redatto da L. F. de Magistris. Size 2½ by 3½ inches. Novara : Istituto Geografico De Agostini, 1914. *Presented by the Publishers.*

The eleventh annual issue of a pocket atlas and calendar, giving general maps on small scales, and statistical information concerning all parts of the world.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, from February 1 to 28, 1914. *Presented by the Hydrographer, Admiralty.*

New Charts—No. 2006, Scotland, west coast: River Clyde—Gourock to Dumbarton (Plan: Entrance to Gare loch), 4*s*. 2819, Mediterranean sea—Plans on the south coast of France: Baie de la Ciotat, Baie de Bandol and Baie de Sanary (Saint Nazaire), 4*s*. 298, Newfoundland: St. John's harbour, 3*s*. **New Editions**—A to V, Index charts, *each* 1*s*. Y, Index chart of Admiralty sailing directions, 1*s*. Z, Index chart of Admiralty list of lights, 1*s*. 2450, England, south coast: Portland to Owers, 3*s*. 2581, Scotland, Orkney islands: Scapa Flow and approaches—southern sheet, 3*s*. 2844, Ireland, south-west coast: Dingle and Ventry harbours, 3*s*. 60, English Channel islands: Alderney and the Casquets, 4*s*. 3509, North sea: Mouths of the Ems, 3*s*. 2602, France, north coast: Port de Cherbourg, 3*s*. 2714, Portugal: Port Setubal, 2*s*. 1130, Mediterranean, Sardinia: Cagliari bay (New plan of Cagliari harbour on this sheet), 2*s*. 1128, Mediterranean, Sardinia—Ports in Sardinia: Ports Conte and Alghero, Port Alghero, Port Torres, Gulf of Oristano, Arbatax road, 2*s*. 974, Mediterranean, Malta: Valletta harbours, 3*s*. 715, Indian ocean: Rodriguez island (Plans: Mathurin bay, Port South-east), 2*s*. 744, India, west coast: Cape Ramas to Alvagudda (Plan: Entrance of Tadri river), 3*s*. 1261, Cochin China: Saigon river to Kam ranh bay, 4*s*. 1741, China: Chu kiang or Canton river—Sheet 2: Lankit spit to Tiger island, including Chuen pi and Boca channels, 3*s*. 1811, China, east coast: Kue shan islands to Nimrod sound, 2*s*. 1124, China, east coast: Southern approach to the Yang-tse kiang: Video to Cape Yang-tse (Plan of Bonham strait on this sheet erased), 3*s*. 2678, China: Yang-tse kiang—Sheet 2: Nanking to Tung liu (Plan: Nanking anchorage, 3*s*. 2265, Japan, inland sea: Kobe and Hyogo bays, 2*s*. 3469, Japan, inland sea: Hiroshima wan (Plans: Ono seto, Karoto koseto), 3*s*. 1385, Pacific ocean, Tonga or Friendly islands: Nukualofa anchorage, Nomuka harbour, Eua island, Falcon island, 3*s*. 1324, South America, east coast: Rio de la Plata to Cape Dos Bahias (Plan: Mar del Plata road) (Plans added: Rio Negro, San Blas harbour, Union bay), 3*s*. 2544, South America, east coast: Rio de la Plata (Plans: Port La Plata, Lobos), 6*s*. 2526, South America, east coast: Buenos Aires roads and adjacent coast from Quilmes to Punta Olivos, 3*s*. 1435, West Indies, Bahamas: Salt Cay anchorage and Hanover sound, 3*s*. 130, West Indies, Leeward islands: Anguilla to Puerto Rico, showing the approaches to the Virgin islands (Plan added: Sombrero island), 3*s*. 1489, West Indies, Bahamas: Island of New Providence, 3*s*. 446, West Indies: Jamaica (Plan added: Morant cays), 3*s*. 485, West Indies, Leeward islands: Santa Cruz (Plan: Christianstaed harbour), 3*s*. 311, Nova Scotia: Halifax harbour (Plan: Halifax dockyard), 3*s*.

(*J. D. Potter, Agent.*)

Atlantic, North. **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, February, 1914. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

Atlantic, North, and Mediterranean. **Meteorological Office.**

Monthly Meteorological charts of the North Atlantic and Mediterranean, March, 1914. London: Meteorological Office, 1914. *Price* 6*d*. *each. Presented by the Meteorological Office.*

Indian Ocean. **Meteorological Office.**

Monthly Meteorological charts of the Indian Ocean, March, 1914. London: Meteorological Office, 1914. *Price* 6*d*. *each. Presented by the Meteorological Office.*

Indian Ocean. **U.S. Hydrographic Office.**

Pilot chart of the Indian Ocean, April, 1914. Washington: U.S. Hydrographic Office, 1914. *Presented by the U.S. Hydrographic Office.*

Pacific, North. **U.S. Hydrographic Office.**

Pilot chart of the North Pacific Ocean, April, 1914. Washington: U.S. Hydrographic Office, 1914. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Arabia. **Leachman.**

Thirty-two photographs of Arabia, taken by Captain G. E. Leachman, 1912. *Presented by Captain G. E. Leachman.*

As Captain Leachman travelled through a very little-known part of Arabia, the views are of special interest and importance. They measure 3¼ by 5¼ inches, and considering the circumstances under which they were taken, are remarkably good.

(1–3) Wells of Hazil; (4) Nefud, near Leina; (5) Ard-el-Madhua and plains beyond; (6 and 7) Kusaiba; (8 and 9) Ayun el Kasim; (10–12) Boreida; (13) el Mudhnib; (14) Approach to Shakra; (15) Walls of Shakra; (16–19) Jebel Tuweik; (20) Ruined Dereiya; (21) Riadh; (22) Riadh from the south; (23) Riadh in a dust-storm; (24) Walls of Riadh and Hasa gate; (25) Great mosque and typical Wahabi minaret, Riadh; (26) Great cemetery, Riadh; (27) Well in Riadh; (28) Natives of Riadh outside walls; (29) Palace slaves in Riadh; (30) Sidr trees in bed of a wadi; (31) Sandbelt, Bitte; (32) Camp, Dahana.

East Africa Protectorate. **Clark.**

Thirty-six photographs of the East Africa Protectorate, taken by J. Percival Clark, Esq. *Presented by J. Percival Clark, Esq.*

A set of platinotype enlargements of varying merit, measuring 4¼ by 7 inches, characteristic of the scenery of the country. The following are the titles:—

(1) A coast "Safari" party and camp; (2) Government station at Mwatate, Taita hills; (3) East Africa jungle; (4) A "Safari" party on the march; (5 and 6) The watering-place at Bondoni, Wakamba country; (7) Camp near Bondoni; (8) The banks of the Athi river, on the track to Kitui; (9 and 10) The aerial cableway across the Athi river, Kitui track; (11 and 12) The ford, dry season, Athi river, Kitui track; (13) Falls on the Athi river, above Kitui track; (14) The Athi river above the falls, near Kitui track; (15) The Athi river below the Kitui track; (16) Mount Mutito, north-east of Kitui; (17) The summit of Mount Mutito; (18) Fort, Government station, and township site of Naivasha, in 1908; (19) Naivasha township site and railway station, with lake and Eburu mountain in background, 1908; (20) Naivasha, looking across the lake, 1908; (21) Naivasha, with lake and Mount Lonongot in background; (22 and 23) Nakuru, 1909; (24) In camp on slopes of Mau escarpment; (25) Bridge on the Uganda railway; (26) Indian dhows in Mombasa harbour; (27) Shella point, near Lamu; (28) Nearing the town of Lamu from the sea; (29) The mouth of the Ozi river at Kipini; (30) The Ozi river; (31) On the Tana river near Golbanti, showing Ookomo village; (32 and 33) Ngao, Tana river; (34) Takaungu; (35 and 36) Old Portuguese defences of Mombasa island.

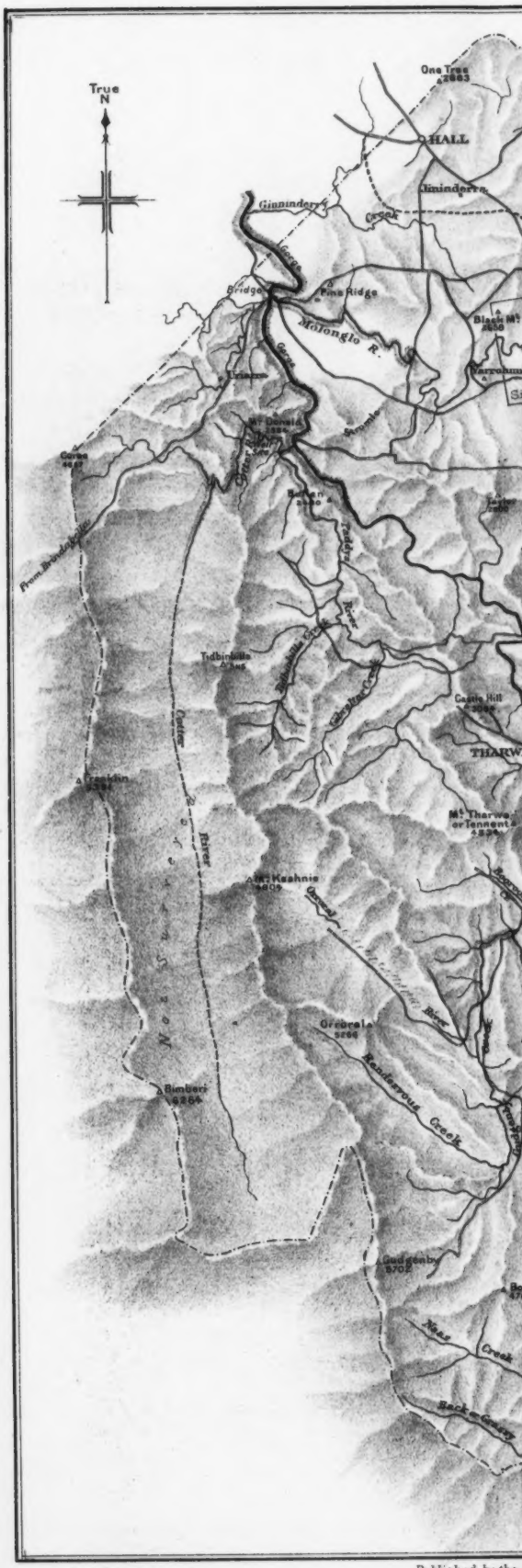
Spitsbergen and Bear island. **Morrell.**

Thirty-three photographs of Spitsbergen and Bear island, taken by the Rev. R. Conyers Morrell, 1913. *Presented by the Rev. R. Conyers Morrell.*

These photographs, many of which are excellent specimens, measure 3 by 4 inches. They are mounted on brown cards, and the donor has written a careful description on the back of each.

(1) Pack ice, 80° 9′ N., 10° 20′ E.; (2–4) Smeerenburg; (5 and 6) Dane's Gat; (7) Dane's island; (8) Virgo bay; (9) Dane's island rocks; (10) Remains of Mr. Wellman's balloon-shed, Virgo bay; (11) Remains of Andree's house, Virgo bay; (12–14) Louis Mayer glacier, Moller bay; (15–20) Icebergs, Lilliehook bay, Cross bay; (21–25) Arctic Coal Company's station and bunkhouses, Advent bay; (26) Advent point; (27) Arctic poppy (*Papaver radicatum*), Longyear valley, Advent bay; (28) Midnight sun, Advent bay; (29) "Storm," Amundsen South Polar Expedition dog, Green harbour; (30) Bear island, 74° 30′ N., 19° E.; (31 and 32) Ditto; (33) Norden-Fieldske Damp. skibs. selskab ship, returning from bear hunting in Spitsbergen.

N.B.—It would greatly add to the value of the collection of Photographs which have been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.



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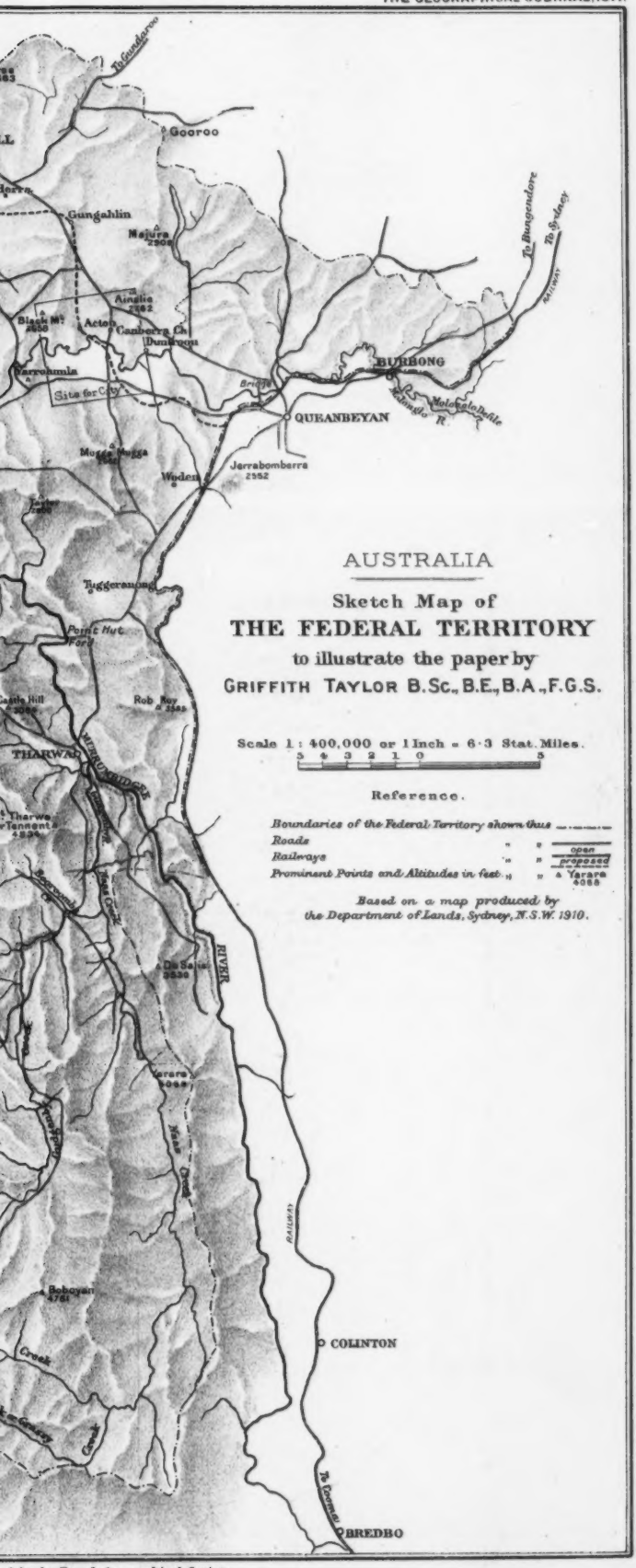


AUSTRALIA

Sketch Map of

THE FEDERAL TERRITORY

to illustrate the paper by

GRIFFITH TAYLOR B.Sc., B.E., B.A., F.G.S.

Scale 1 : 400,000 or 1 Inch = 6·3 Stat. Miles.

5 4 3 2 1 0 5

Reference.

Boundaries of the Federal Territory shown thus .....

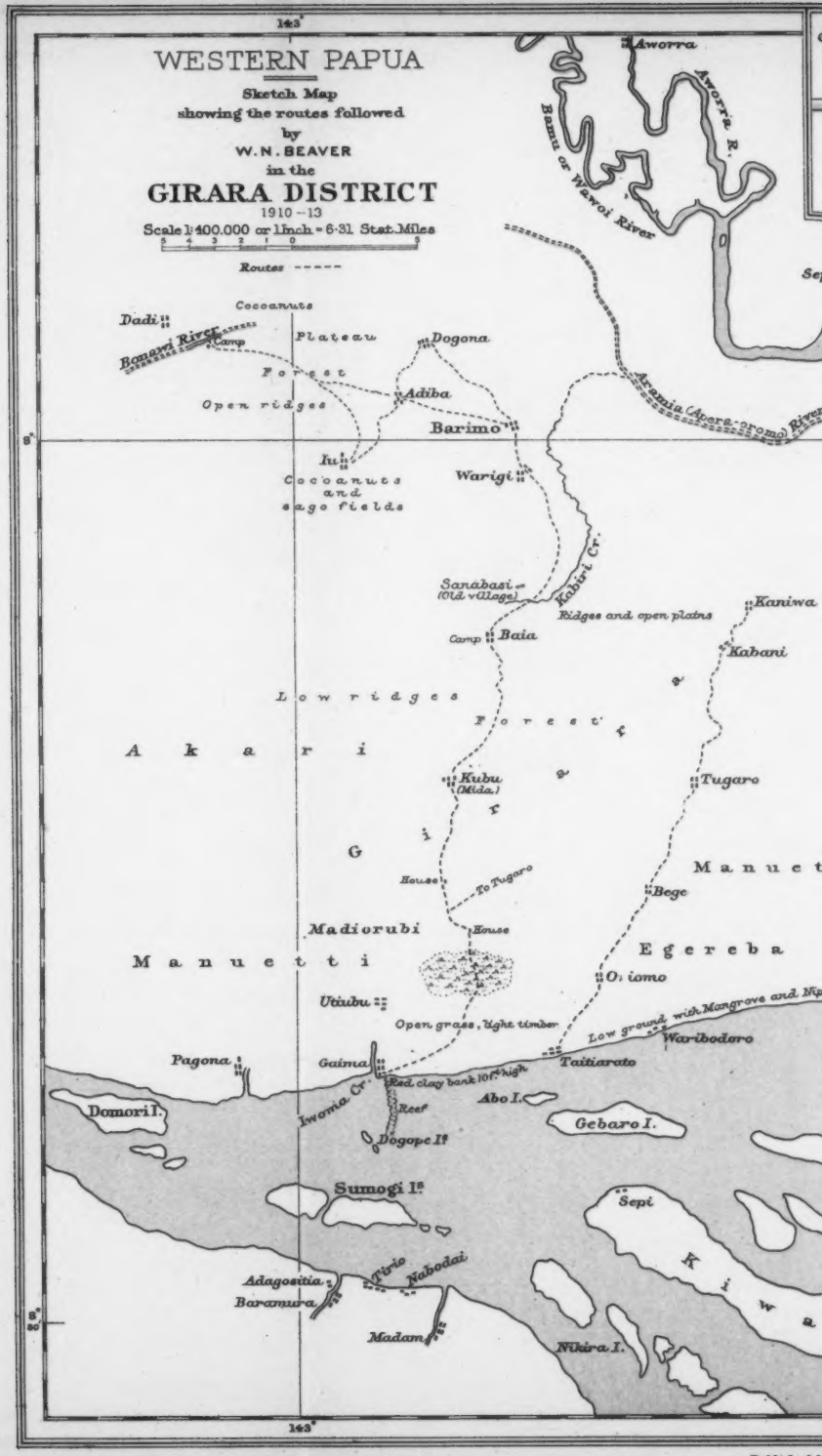
Roads " "

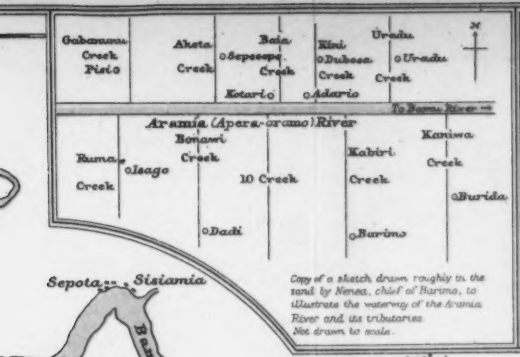
Railways " " *open* / *proposed*

Prominent Points and Altitudes in feet " " △ Yarara 4088

Based on a map produced by the Department of Lands, Sydney, N.S.W. 1910.

ed by the Royal Geographical Society


WESTERN PAPUA
Sketch Map
showing the routes followed
by
W. N. BEAVER
in the
GIRARA DISTRICT
1910 – 13
Scale 1:400.000 or 1 inch = 6·31 Stat. Miles
Routes
142°
8°
Aworra
Aworra R.
Bamu or Wawoi River
Cocoanuts
Dadi
Bomavi River
Camp
Plateau
Dogona
Forest
Open ridges
Adiba
Aramia (Apore-Bromo) River
Barimo
Iu
Cocoanuts and sago fields
Warigi
Kabiri Cr.
Sanabasi (Old village)
Ridges and open plains
Kaniwa
Camp
Baia
Kabani
Low ridges
Forest
A k a r i
Kubu (Mida.)
Tugaro
G i
Manuc
House
To Tugaro
Bege
Madiorubi
House
Manuetti
Egereba
Oiiomo
Utiubu
Open grass, light timber
Low ground with Mangrove and Nip
Waribodoro
Pagona
Gaima
Red clay bank 10ft. high
Taitiarato
Iwoma Cr.
Reef
Abo I.
Domori I.
Gebaro I.
Dogope Is
Sumogi Is
Sepi
Kiwa
Adagostia
Baramura
Nabodai
Madam
Nikira I.
Published



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WESTERN PAPUA
Beaver.